

METHOD DETECTION LIMIT STUDY

DATE COMPLETED: March 2015		INSTRUMENT ID: PE ELAN 9000														
METHOD NUMBER: 200.8		METHOD DESCRIPTION: ICP-MS														
PREP METHOD: Direct Analysis		ANALYST: JGS														
ANALYTE	SPIKE CONC ug/L	REPLICATE MEASUREMENT							AVG ug/L	Recovery of Spike %	PREC. ug/L	MDL ug/L	Report. Limit ug/L	STATUS*	FLAG	FLAG
		3/2/15 1	3/2/15 2	3/2/15 3	3/5/15 4	3/5/15 5	3/5/15 6	3/11/15 7								
Be 9	0.100	0.103	0.104	0.102	0.096	0.106	0.114	0.107	0.1046	104.57%	0.00547	0.01718	0.500	p	False	False
V 51	0.300	0.3290	0.3010	0.3060	0.3020	0.3180	0.2990	0.3020	0.3081	102.71%	0.01116	0.03503	0.500	p	False	False
Cr 52	0.300	0.2170	0.1810	0.2160	0.3470	0.3440	0.2470	0.2580	0.2586	86.19%	0.06430	0.20191	1.000	p	False	False
Mn 55	0.100	0.087	0.102	0.085	0.127	0.114	0.122	0.126	0.1090	109.00%	0.01787	0.05611	0.500	p	False	False
Co 59	0.050	0.051	0.050	0.055	0.050	0.052	0.049	0.052	0.0513	102.57%	0.00198	0.00620	0.100	p	False	False
Ni 60	0.050	0.060	0.038	0.050	0.053	0.053	0.049	0.053	0.0509	101.71%	0.00667	0.02094	0.500	p	False	False
Cu 63	0.100	0.063	0.067	0.108	0.075	0.077	0.070	0.108	0.0811	81.14%	0.01893	0.05945	0.100	p	False	False
Zn 66	0.500	0.4680	0.5360	0.5440	0.6170	0.5380	0.7810	0.8070	0.6130	122.60%	0.13116	0.41184	1.000	p	False	False
As 75	0.300	0.2920	0.2920	0.3330	0.3690	0.3510	0.3400	0.2280	0.3150	105.00%	0.04794	0.15052	0.500	p	False	False
Se 82	0.500	0.279	0.598	0.357	0.533	0.393	0.467	0.384	0.4301	86.03%	0.10941	0.34353	1.000	p	False	False
Mo 98	0.050	0.065	0.075	0.057	0.069	0.057	0.058	0.057	0.0626	125.14%	0.00725	0.02278	0.500	p	False	False
Ag 107	0.050	0.055	0.054	0.054	0.052	0.049	0.051	0.032	0.0496	99.14%	0.00802	0.02518	0.100	p	False	False
Cd 111	0.050	0.044	0.050	0.055	0.044	0.048	0.053	0.053	0.0496	99.14%	0.00443	0.01391	0.100	p	False	False
Sb 123	0.300	0.4230	0.4290	0.3810	0.4080	0.4120	0.4020	0.4470	0.4146	138.19%	0.02108	0.06619	0.500	p	False	False
Ba 137	0.050	0.053	0.052	0.073	0.065	0.052	0.043	0.031	0.0527	105.43%	0.01372	0.04308	0.500	p	False	False
Tl 205	0.050	0.067	0.057	0.058	0.059	0.056	0.054	0.053	0.0577	115.43%	0.00461	0.01447	0.100	p	False	False
Pb 208	0.100	0.113	0.108	0.103	0.088	0.084	0.088	0.102	0.0980	98.00%	0.01127	0.03539	0.500	p	False	False
U 238	0.050	0.053	0.053	0.052	0.049	0.048	0.048	0.053	0.0509	101.71%	0.00241	0.00757	0.100	p	False	False

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MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f	1	0	
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f	1	0	
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f	1	0	
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0

Be 9	0.010															0.500					Be 9
V 51	0.010															0.500					V 51
Cr 52	0.010															1.000					Cr 52
Mn 55	0.010															0.500					Mn 55
Co 59	0.010															0.100					Co 59
Ni 60	0.010															0.500					Ni 60
Cu 63	0.010															0.100					Cu 63
Zn 66	0.010															1.000					Zn 66
As 75	0.010															0.500					As 75
Se 82	0.050															1.000					Se 82
Mo 98	0.010															0.500					Mo 98
Ag 107	0.010															0.100					Ag 107
Cd 111	0.010															0.100					Cd 111
Sb 123	0.010															0.500					Sb 123
Ba 137	0.010															0.500					Ba 137
Tl 205	0.010															0.100					Tl 205
Pb 208	0.010															0.500					Pb 208
U 238	0.010															0.100					U 238

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MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	MDL < 0.10X spike level
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	MDL > spike level
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	MDL > reporting limit
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	% recovery < 50%
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	% recovery > 150%
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	MDL meets all the above

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MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	5	4.30	4.40
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	5	4.10	5.10
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	6	4.10	5.10
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	10	4.10	5.10
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	5	7.25	8.10
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	5	4.40	4.25

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MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	97.43%	1.73	5.43
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	81.19%	1.73	5.43
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	48.71%	1.73	5.43
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	152.29%	0.26	0.83
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	88.71%	0.24	0.76

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MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	10	f	
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	5	f	
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	10	p	w
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	5	p	w
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	5	p	

Be 9	0.050	0.064	0.063	0.053	0.087	0.067	0.050	0.050	0.0620	124.00%	0.01306	0.04102	0.500	p		False	False	Be 9
V 51	0.050	0.041	0.030	0.017	0.038	0.029	0.036	0.082	0.0390	78.00%	0.02053	0.06445	0.500	f		True	False	V 51
Cr 52	0.050	0.052	0.078	0.083	0.123	-0.008	0.036	0.078	0.0631	126.29%	0.04151	0.13036	1.000	f		True	False	Cr 52
Mn 55	0.050	0.072	0.056	0.100	0.051	0.068	0.067	0.082	0.0709	141.71%	0.01640	0.05148	0.500	f		True	False	Mn 55
Co 59	0.050	0.051	0.050	0.055	0.050	0.052	0.049	0.052	0.0513	102.57%	0.00198	0.00620	0.100	p		False	False	Co 59
Ni 60	0.050	0.060	0.038	0.050	0.053	0.053	0.049	0.053	0.0509	101.71%	0.00667	0.02094	0.500	p		False	False	Ni 60
Cu 63	0.050	0.029	0.013	0.052	0.050	0.052	0.057	0.050	0.0433	86.57%	0.01608	0.05049	0.100	f		True	False	Cu 63
Zn 66	0.050	0.260	0.010	0.607	0.761	0.581	0.788	0.761	0.5383	1076.57%	0.29570	0.92850	1.000	f	w	True	True	Zn 66
As 75	0.050	0.052	0.053	0.075	0.157	0.119	0.094	0.073	0.0890	178.00%	0.03800	0.11933	0.500	f	w	True	True	As 75
Se 82	0.250	-0.048	0.101	0.120	0.216	0.113	0.110	-0.287	0.0464	18.57%	0.16619	0.52183	1.000	f	w	True	True	Se 82
Mo 98	0.050	0.065	0.075	0.057	0.069	0.057	0.058	0.057	0.0626	125.14%	0.00725	0.02278	0.500	p		False	False	Mo 98
Ag 107	0.050	0.055	0.054	0.054	0.052	0.049	0.051	0.032	0.0496	99.14%	0.00802	0.02518	0.100	p		False	False	Ag 107
Cd 111	0.050	0.044	0.050	0.055	0.044	0.048	0.053	0.053	0.0496	99.14%	0.00443	0.01391	0.1	p		False	False	Cd 111
Sb 123	0.050	0.656	0.541	0.442	0.658	0.402	0.368	0.442	0.5013	1002.57%	0.11883	0.37313	0.500	f	w	True	True	Sb 123
Ba 137	0.050	0.053	0.052	0.073	0.065	0.052	0.043	0.031	0.0527	105.43%	0.01372	0.04308	0.500	p		False	False	Ba 137
Tl 205	0.050	0.067	0.057	0.058	0.059	0.056	0.054	0.053	0.0577	115.43%	0.00461	0.01447	0.100	p		False	False	Tl 205
Pb 208	0.050	0.065	0.061	0.063	0.036	0.033	0.034	0.053	0.0493	98.57%	0.01450	0.04553	0.500	p		False	False	Pb 208
U 238	0.050	0.053	0.053	0.052	0.049	0.048	0.048	0.053	0.0509	101.71%	0.00241	0.00757	0.100	p		False	False	U 238

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MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	MDL > spike level
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	MDL > reporting limit
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	% recovery < 50%
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	% recovery > 150%
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	MDL meets all the above

Be 9	0.050	0.064	0.063	0.053	0.087	0.067	0.050	0.050	0.0620	124.00%	0.01306	0.04102	0.500	p		False	False	0.050	0.064	0.063
V 51	0.050	0.041	0.030	0.017	0.038	0.029	0.036	0.082	0.0390	78.00%	0.02053	0.06445	0.500	f		True	False	0.050	0.041	0.030
Cr 52	0.050	0.052	0.078	0.083	0.123	-0.008	0.036	0.078	0.0631	126.29%	0.04151	0.13036	1.000	f		True	False	0.050	0.052	0.078
Mn 55	0.050	0.072	0.056	0.100	0.051	0.068	0.067	0.082	0.0709	141.71%	0.01640	0.05148	0.500	f		True	False	0.050	0.072	0.056
Co 59	0.050	0.051	0.050	0.055	0.050	0.052	0.049	0.052	0.0513	102.57%	0.00198	0.00620	0.100	p		False	False	0.050	0.051	0.050
Ni 60	0.050	0.060	0.038	0.050	0.053	0.053	0.049	0.053	0.0509	101.71%	0.00667	0.02094	0.500	p		False	False	0.050	0.060	0.038
Cu 63	0.050	0.029	0.013	0.052	0.050	0.052	0.057	0.050	0.0433	86.57%	0.01608	0.05049	0.100	f		True	False	0.050	0.029	0.013
Zn 66	0.050	0.260	0.010	0.607	0.761	0.581	0.788	0.761	0.5383	1076.57%	0.29570	0.92850	1.000	f	w	True	True	0.050	0.260	0.010
As 75	0.050	0.052	0.053	0.075	0.157	0.119	0.094	0.073	0.0890	178.00%	0.03800	0.11933	0.500	f	w	True	True	0.050	0.052	0.053
Se 82	0.250	-0.048	0.101	0.120	0.216	0.113	0.110	-0.287	0.0464	18.57%	0.16619	0.52183	1.000	f	w	True	True	0.250	-0.048	0.101
Mo 98	0.050	0.065	0.075	0.057	0.069	0.057	0.058	0.057	0.0626	125.14%	0.00725	0.02278	0.500	p		False	False	0.050	0.065	0.075
Ag 107	0.050	0.055	0.054	0.054	0.052	0.049	0.051	0.032	0.0496	99.14%	0.00802	0.02518	0.100	p		False	False	0.050	0.055	0.054
Cd 111	0.050	0.044	0.050	0.055	0.044	0.048	0.053	0.053	0.0496	99.14%	0.00443	0.01391	0.1	p		False	False	0.050	0.044	0.050
Sb 123	0.050	0.656	0.541	0.442	0.658	0.402	0.368	0.442	0.5013	1002.57%	0.11883	0.37313	0.500	f	w	True	True	0.050	0.656	0.541
Ba 137	0.050	0.053	0.052	0.073	0.065	0.052	0.043	0.031	0.0527	105.43%	0.01372	0.04308	0.500	p		False	False	0.050	0.053	0.052
Tl 205	0.050	0.067	0.057	0.058	0.059	0.056	0.054	0.053	0.0577	115.43%	0.00461	0.01447	0.100	p		False	False	0.050	0.067	0.057
Pb 208	0.050	0.065	0.061	0.063	0.036	0.033	0.034	0.053	0.0493	98.57%	0.01450	0.04553	0.500	p		False	False	0.050	0.065	0.061
U 238	0.050	0.053	0.053	0.052	0.049	0.048	0.048	0.053	0.0509	101.71%	0.00241	0.00757	0.100	p		False	False	0.050	0.053	0.053

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly an ten times less than the spiking level.
 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly. readsheet to check that calculations an

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	5	4.30	4.40
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	5	4.10	5.10
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	6	4.10	5.10
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	10	4.10	5.10
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	5	7.25	8.10
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	5	4.40	4.25

Be 9	0.050	0.064	0.063	0.053	0.087	0.067	0.050	0.050	0.0620	124.00%	0.01306	0.04102	0.500	p		False	False	0.053	0.087	0.067
V 51	0.050	0.041	0.030	0.017	0.038	0.029	0.036	0.082	0.0390	78.00%	0.02053	0.06445	0.500	f		True	False	0.017	0.038	0.029
Cr 52	0.050	0.052	0.078	0.083	0.123	-0.008	0.036	0.078	0.0631	126.29%	0.04151	0.13036	1.000	f		True	False	0.083	0.123	-0.008
Mn 55	0.050	0.072	0.056	0.100	0.051	0.068	0.067	0.082	0.0709	141.71%	0.01640	0.05148	0.500	f		True	False	0.100	0.051	0.068
Co 59	0.050	0.051	0.050	0.055	0.050	0.052	0.049	0.052	0.0513	102.57%	0.00198	0.00620	0.100	p		False	False	0.055	0.050	0.052
Ni 60	0.050	0.060	0.038	0.050	0.053	0.053	0.049	0.053	0.0509	101.71%	0.00667	0.02094	0.500	p		False	False	0.050	0.053	0.053
Cu 63	0.050	0.029	0.013	0.052	0.050	0.052	0.057	0.050	0.0433	86.57%	0.01608	0.05049	0.100	f		True	False	0.052	0.050	0.052
Zn 66	0.050	0.260	0.010	0.607	0.761	0.581	0.788	0.761	0.5383	1076.57%	0.29570	0.92850	1.000	f	w	True	True	0.607	0.761	0.581
As 75	0.050	0.052	0.053	0.075	0.157	0.119	0.094	0.073	0.0890	178.00%	0.03800	0.11933	0.500	f	w	True	True	0.075	0.157	0.119
Se 82	0.250	-0.048	0.101	0.120	0.216	0.113	0.110	-0.287	0.0464	18.57%	0.16619	0.52183	1.000	f	w	True	True	0.120	0.216	0.113
Mo 98	0.050	0.065	0.075	0.057	0.069	0.057	0.058	0.057	0.0626	125.14%	0.00725	0.02278	0.500	p		False	False	0.057	0.069	0.057
Ag 107	0.050	0.055	0.054	0.054	0.052	0.049	0.051	0.032	0.0496	99.14%	0.00802	0.02518	0.100	p		False	False	0.054	0.052	0.049
Cd 111	0.050	0.044	0.050	0.055	0.044	0.048	0.053	0.053	0.0496	99.14%	0.00443	0.01391	0.1	p		False	False	0.055	0.044	0.048
Sb 123	0.050	0.656	0.541	0.442	0.658	0.402	0.368	0.442	0.5013	1002.57%	0.11883	0.37313	0.500	f	w	True	True	0.442	0.658	0.402
Ba 137	0.050	0.053	0.052	0.073	0.065	0.052	0.043	0.031	0.0527	105.43%	0.01372	0.04308	0.500	p		False	False	0.073	0.065	0.052
Tl 205	0.050	0.067	0.057	0.058	0.059	0.056	0.054	0.053	0.0577	115.43%	0.00461	0.01447	0.100	p		False	False	0.058	0.059	0.056
Pb 208	0.050	0.065	0.061	0.063	0.036	0.033	0.034	0.053	0.0493	98.57%	0.01450	0.04553	0.500	p		False	False	0.063	0.036	0.033
U 238	0.050	0.053	0.053	0.052	0.049	0.048	0.048	0.053	0.0509	101.71%	0.00241	0.00757	0.100	p		False	False	0.052	0.049	0.048

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

d formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.30	4.50	4.60
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	2.20	6.50	7.50
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	2.20	6.50	7.50
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	2.20	6.50	7.50
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.50	7.60	7.50
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.40	4.60	4.90

Be 9	0.050	0.064	0.063	0.053	0.087	0.067	0.050	0.050	0.0620	124.00%	0.01306	0.04102	0.500	p		False	False	0.050	0.050	0.0620
V 51	0.050	0.041	0.030	0.017	0.038	0.029	0.036	0.082	0.0390	78.00%	0.02053	0.06445	0.500	f		True	False	0.036	0.082	0.0390
Cr 52	0.050	0.052	0.078	0.083	0.123	-0.008	0.036	0.078	0.0631	126.29%	0.04151	0.13036	1.000	f		True	False	0.036	0.078	0.0631
Mn 55	0.050	0.072	0.056	0.100	0.051	0.068	0.067	0.082	0.0709	141.71%	0.01640	0.05148	0.500	f		True	False	0.067	0.082	0.0709
Co 59	0.050	0.051	0.050	0.055	0.050	0.052	0.049	0.052	0.0513	102.57%	0.00198	0.00620	0.100	p		False	False	0.049	0.052	0.0513
Ni 60	0.050	0.060	0.038	0.050	0.053	0.053	0.049	0.053	0.0509	101.71%	0.00667	0.02094	0.500	p		False	False	0.049	0.053	0.0509
Cu 63	0.050	0.029	0.013	0.052	0.050	0.052	0.057	0.050	0.0433	86.57%	0.01608	0.05049	0.100	f		True	False	0.057	0.050	0.0433
Zn 66	0.050	0.260	0.010	0.607	0.761	0.581	0.788	0.761	0.5383	1076.57%	0.29570	0.92850	1.000	f	w	True	True	0.788	0.761	0.5383
As 75	0.050	0.052	0.053	0.075	0.157	0.119	0.094	0.073	0.0890	178.00%	0.03800	0.11933	0.500	f	w	True	True	0.094	0.073	0.0890
Se 82	0.250	-0.048	0.101	0.120	0.216	0.113	0.110	-0.287	0.0464	18.57%	0.16619	0.52183	1.000	f	w	True	True	0.110	-0.287	0.0464
Mo 98	0.050	0.065	0.075	0.057	0.069	0.057	0.058	0.057	0.0626	125.14%	0.00725	0.02278	0.500	p		False	False	0.058	0.057	0.0626
Ag 107	0.050	0.055	0.054	0.054	0.052	0.049	0.051	0.032	0.0496	99.14%	0.00802	0.02518	0.100	p		False	False	0.051	0.032	0.0496
Cd 111	0.050	0.044	0.050	0.055	0.044	0.048	0.053	0.053	0.0496	99.14%	0.00443	0.01391	0.1	p		False	False	0.053	0.053	0.0496
Sb 123	0.050	0.656	0.541	0.442	0.658	0.402	0.368	0.442	0.5013	1002.57%	0.11883	0.37313	0.500	f	w	True	True	0.368	0.442	0.5013
Ba 137	0.050	0.053	0.052	0.073	0.065	0.052	0.043	0.031	0.0527	105.43%	0.01372	0.04308	0.500	p		False	False	0.043	0.031	0.0527
Tl 205	0.050	0.067	0.057	0.058	0.059	0.056	0.054	0.053	0.0577	115.43%	0.00461	0.01447	0.100	p		False	False	0.054	0.053	0.0577
Pb 208	0.050	0.065	0.061	0.063	0.036	0.033	0.034	0.053	0.0493	98.57%	0.01450	0.04553	0.500	p		False	False	0.034	0.053	0.0493
U 238	0.050	0.053	0.053	0.052	0.049	0.048	0.048	0.053	0.0509	101.71%	0.00241	0.00757	0.100	p		False	False	0.048	0.053	0.0509

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level. the MDL value has been increased

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.30	4.50	4.41
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	4.40	4.30	4.87
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	4.40	4.30	4.87
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	4.40	4.30	4.87
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.75	7.60	7.61
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.30	4.20	4.44

Be 9	0.050	0.064	0.063	0.053	0.087	0.067	0.050	0.050	0.0620	124.00%	0.01306	0.04102	0.500	p		False	False	124.00%	0.01306	0.04102
V 51	0.050	0.041	0.030	0.017	0.038	0.029	0.036	0.082	0.0390	78.00%	0.02053	0.06445	0.500	f		True	False	78.00%	0.02053	0.06445
Cr 52	0.050	0.052	0.078	0.083	0.123	-0.008	0.036	0.078	0.0631	126.29%	0.04151	0.13036	1.000	f		True	False	126.29%	0.04151	0.13036
Mn 55	0.050	0.072	0.056	0.100	0.051	0.068	0.067	0.082	0.0709	141.71%	0.01640	0.05148	0.500	f		True	False	141.71%	0.01640	0.05148
Co 59	0.050	0.051	0.050	0.055	0.050	0.052	0.049	0.052	0.0513	102.57%	0.00198	0.00620	0.100	p		False	False	102.57%	0.00198	0.00620
Ni 60	0.050	0.060	0.038	0.050	0.053	0.053	0.049	0.053	0.0509	101.71%	0.00667	0.02094	0.500	p		False	False	101.71%	0.00667	0.02094
Cu 63	0.050	0.029	0.013	0.052	0.050	0.052	0.057	0.050	0.0433	86.57%	0.01608	0.05049	0.100	f		True	False	86.57%	0.01608	0.05049
Zn 66	0.050	0.260	0.010	0.607	0.761	0.581	0.788	0.761	0.5383	1076.57%	0.29570	0.92850	1.000	f	w	True	True	1076.57%	0.29570	0.92850
As 75	0.050	0.052	0.053	0.075	0.157	0.119	0.094	0.073	0.0890	178.00%	0.03800	0.11933	0.500	f	w	True	True	178.00%	0.03800	0.11933
Se 82	0.250	-0.048	0.101	0.120	0.216	0.113	0.110	-0.287	0.0464	18.57%	0.16619	0.52183	1.000	f	w	True	True	18.57%	0.16619	0.52183
Mo 98	0.050	0.065	0.075	0.057	0.069	0.057	0.058	0.057	0.0626	125.14%	0.00725	0.02278	0.500	p		False	False	125.14%	0.00725	0.02278
Ag 107	0.050	0.055	0.054	0.054	0.052	0.049	0.051	0.032	0.0496	99.14%	0.00802	0.02518	0.100	p		False	False	99.14%	0.00802	0.02518
Cd 111	0.050	0.044	0.050	0.055	0.044	0.048	0.053	0.053	0.0496	99.14%	0.00443	0.01391	0.1	p		False	False	99.14%	0.00443	0.01391
Sb 123	0.050	0.656	0.541	0.442	0.658	0.402	0.368	0.442	0.5013	1002.57%	0.11883	0.37313	0.500	f	w	True	True	1002.57%	0.11883	0.37313
Ba 137	0.050	0.053	0.052	0.073	0.065	0.052	0.043	0.031	0.0527	105.43%	0.01372	0.04308	0.500	p		False	False	105.43%	0.01372	0.04308
Tl 205	0.050	0.067	0.057	0.058	0.059	0.056	0.054	0.053	0.0577	115.43%	0.00461	0.01447	0.100	p		False	False	115.43%	0.00461	0.01447
Pb 208	0.050	0.065	0.061	0.063	0.036	0.033	0.034	0.053	0.0493	98.57%	0.01450	0.04553	0.500	p		False	False	98.57%	0.01450	0.04553
U 238	0.050	0.053	0.053	0.052	0.049	0.048	0.048	0.053	0.0509	101.71%	0.00241	0.00757	0.100	p		False	False	101.71%	0.00241	0.00757

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	88.29%	0.12	0.38
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	97.43%	1.73	5.43
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	81.19%	1.73	5.43
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	48.71%	1.73	5.43
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	152.29%	0.26	0.83
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	88.71%	0.24	0.76

Be 9	0.050	0.064	0.063	0.053	0.087	0.067	0.050	0.050	0.0620	124.00%	0.01306	0.04102	0.500	p		False	False	0.500	p	
V 51	0.050	0.041	0.030	0.017	0.038	0.029	0.036	0.082	0.0390	78.00%	0.02053	0.06445	0.500	f		True	False	0.500	f	
Cr 52	0.050	0.052	0.078	0.083	0.123	-0.008	0.036	0.078	0.0631	126.29%	0.04151	0.13036	1.000	f		True	False	1.000	f	
Mn 55	0.050	0.072	0.056	0.100	0.051	0.068	0.067	0.082	0.0709	141.71%	0.01640	0.05148	0.500	f		True	False	0.500	f	
Co 59	0.050	0.051	0.050	0.055	0.050	0.052	0.049	0.052	0.0513	102.57%	0.00198	0.00620	0.100	p		False	False	0.100	p	
Ni 60	0.050	0.060	0.038	0.050	0.053	0.053	0.049	0.053	0.0509	101.71%	0.00667	0.02094	0.500	p		False	False	0.500	p	
Cu 63	0.050	0.029	0.013	0.052	0.050	0.052	0.057	0.050	0.0433	86.57%	0.01608	0.05049	0.100	f		True	False	0.100	f	
Zn 66	0.050	0.260	0.010	0.607	0.761	0.581	0.788	0.761	0.5383	1076.57%	0.29570	0.92850	1.000	f	w	True	True	1.000	f	w
As 75	0.050	0.052	0.053	0.075	0.157	0.119	0.094	0.073	0.0890	178.00%	0.03800	0.11933	0.500	f	w	True	True	0.500	f	w
Se 82	0.250	-0.048	0.101	0.120	0.216	0.113	0.110	-0.287	0.0464	18.57%	0.16619	0.52183	1.000	f	w	True	True	1.000	f	w
Mo 98	0.050	0.065	0.075	0.057	0.069	0.057	0.058	0.057	0.0626	125.14%	0.00725	0.02278	0.500	p		False	False	0.500	p	
Ag 107	0.050	0.055	0.054	0.054	0.052	0.049	0.051	0.032	0.0496	99.14%	0.00802	0.02518	0.100	p		False	False	0.100	p	
Cd 111	0.050	0.044	0.050	0.055	0.044	0.048	0.053	0.053	0.0496	99.14%	0.00443	0.01391	0.1	p		False	False	0.1	p	
Sb 123	0.050	0.656	0.541	0.442	0.658	0.402	0.368	0.442	0.5013	1002.57%	0.11883	0.37313	0.500	f	w	True	True	0.500	f	w
Ba 137	0.050	0.053	0.052	0.073	0.065	0.052	0.043	0.031	0.0527	105.43%	0.01372	0.04308	0.500	p		False	False	0.500	p	
Tl 205	0.050	0.067	0.057	0.058	0.059	0.056	0.054	0.053	0.0577	115.43%	0.00461	0.01447	0.100	p		False	False	0.100	p	
Pb 208	0.050	0.065	0.061	0.063	0.036	0.033	0.034	0.053	0.0493	98.57%	0.01450	0.04553	0.500	p		False	False	0.500	p	
U 238	0.050	0.053	0.053	0.052	0.049	0.048	0.048	0.053	0.0509	101.71%	0.00241	0.00757	0.100	p		False	False	0.100	p	

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	5	f	
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	10	f	
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	5	f	
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	10	p	w
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	5	p	w
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	5	p	

Be 9	0.100	0.103	0.104	0.102	0.096	0.106	0.114	0.107	0.1046	104.57%	0.00547	0.01718	0.500	p		False	False	Be 9
V 51	0.100	0.076	0.055	0.095	0.078	0.065	0.085	0.143	0.0853	85.29%	0.02856	0.08967	0.500	p		False	False	V 51
Cr 52	0.100	0.125	0.114	0.036	0.047	0.022	0.022	0.125	0.0701	70.14%	0.04878	0.15318	1.000	f		True	False	Cr 52
Mn 55	0.100	0.087	0.102	0.085	0.127	0.114	0.122	0.126	0.1090	109.00%	0.01787	0.05611	0.500	p		False	False	Mn 55
Co 59	0.100	0.099	0.100	0.098	0.096	0.099	0.099	0.103	0.0991	99.14%	0.00212	0.00664	0.100	f		True	False	Co 59
Ni 60	0.100	0.080	0.089	0.095	0.071	0.089	0.079	0.095	0.0854	85.43%	0.00902	0.02831	0.500	p		False	False	Ni 60
Cu 63	0.100	0.063	0.067	0.108	0.075	0.077	0.070	0.108	0.0811	81.14%	0.01893	0.05945	0.100	p		False	False	Cu 63
Zn 66	0.100	0.046	0.046	0.527	-4.145	-4.158	-4.097	0.527	-1.6077	1607.71%	2.37072	7.44406	1.000	f	w	True	True	Zn 66
As 75	0.100	0.101	0.122	0.082	0.198	0.136	0.150	0.115	0.1291	129.14%	0.03761	0.11811	0.500	f		True	False	As 75
Se 82	0.500	0.279	0.598	0.357	0.533	0.393	0.467	0.384	0.4301	86.03%	0.10941	0.34353	1.000	p		False	False	Se 82
Mo 98	0.100	0.104	0.108	0.103	0.105	0.102	0.102	0.107	0.1044	104.43%	0.00237	0.00744	0.500	f		True	False	Mo 98
Ag 107	0.100	0.095	0.101	0.097	0.097	0.093	0.088	0.054	0.0893	89.29%	0.01607	0.05046	0.100	p		False	False	Ag 107
Cd 111	0.100	0.107	0.099	0.103	0.119	0.11	0.091	0.101	0.1043	104.29%	0.00888	0.02789	0.100	p		False	False	Cd 111
Sb 123	0.100	0.393	0.319	0.297	0.377	0.312	0.239	0.418	0.3364	336.43%	0.06251	0.19629	0.500	f	w	True	True	Sb 123
Ba 137	0.100	0.103	0.102	0.099	0.075	0.069	0.070	0.088	0.0866	86.57%	0.01518	0.04765	0.500	p		False	False	Ba 137
Tl 205	0.100	0.110	0.101	0.099	0.103	0.095	0.098	0.101	0.1010	101.00%	0.00473	0.01484	0.100	p		False	False	Tl 205
Pb 208	0.100	0.113	0.108	0.103	0.088	0.084	0.088	0.102	0.0980	98.00%	0.01127	0.03539	0.500	p		False	False	Pb 208
U 238	0.100	0.103	0.100	0.097	0.098	0.096	0.097	0.110	0.1001	100.14%	0.00495	0.01553	0.100	p		False	False	U 238

(*) The calculated MDL is more than ten times less than the spiking level.

(*) The calculated MDL is more than ten times less than the spiking level.

MDL Spreadsheet Validation

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	MDL < 0.10X spike level
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	MDL > spike level
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	MDL > reporting limit
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	% recovery < 50%
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	% recovery > 150%
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	MDL meets all the above

Be 9	0.100	0.103	0.104	0.102	0.096	0.106	0.114	0.107	0.1046	104.57%	0.00547	0.01718	0.500	p		False	False	0.100	0.103	0.104
V 51	0.100	0.076	0.055	0.095	0.078	0.065	0.085	0.143	0.0853	85.29%	0.02856	0.08967	0.500	p		False	False	0.100	0.076	0.055
Cr 52	0.100	0.125	0.114	0.036	0.047	0.022	0.022	0.125	0.0701	70.14%	0.04878	0.15318	1.000	f		True	False	0.100	0.125	0.114
Mn 55	0.100	0.087	0.102	0.085	0.127	0.114	0.122	0.126	0.1090	109.00%	0.01787	0.05611	0.500	p		False	False	0.100	0.087	0.102
Co 59	0.100	0.099	0.100	0.098	0.096	0.099	0.099	0.103	0.0991	99.14%	0.00212	0.00664	0.100	f		True	False	0.100	0.099	0.100
Ni 60	0.100	0.080	0.089	0.095	0.071	0.089	0.079	0.095	0.0854	85.43%	0.00902	0.02831	0.500	p		False	False	0.100	0.080	0.089
Cu 63	0.100	0.063	0.067	0.108	0.075	0.077	0.070	0.108	0.0811	81.14%	0.01893	0.05945	0.100	p		False	False	0.100	0.063	0.067
Zn 66	0.100	0.046	0.046	0.527	-4.145	-4.158	-4.097	0.527	-1.6077	1607.71%	2.37072	7.44406	1.000	f	w	True	True	0.100	0.046	0.046
As 75	0.100	0.101	0.122	0.082	0.198	0.136	0.150	0.115	0.1291	129.14%	0.03761	0.11811	0.500	f		True	False	0.100	0.101	0.122
Se 82	0.500	0.279	0.598	0.357	0.533	0.393	0.467	0.384	0.4301	86.03%	0.10941	0.34353	1.000	p		False	False	0.500	0.279	0.598
Mo 98	0.100	0.104	0.108	0.103	0.105	0.102	0.102	0.107	0.1044	104.43%	0.00237	0.00744	0.500	f		True	False	0.100	0.104	0.108
Ag 107	0.100	0.095	0.101	0.097	0.097	0.093	0.088	0.054	0.0893	89.29%	0.01607	0.05046	0.100	p		False	False	0.100	0.095	0.101
Cd 111	0.100	0.107	0.099	0.103	0.119	0.11	0.091	0.101	0.1043	104.29%	0.00888	0.02789	0.100	p		False	False	0.100	0.107	0.099
Sb 123	0.100	0.393	0.319	0.297	0.377	0.312	0.239	0.418	0.3364	336.43%	0.06251	0.19629	0.500	f	w	True	True	0.100	0.393	0.319
Ba 137	0.100	0.103	0.102	0.099	0.075	0.069	0.070	0.088	0.0866	86.57%	0.01518	0.04765	0.500	p		False	False	0.100	0.103	0.102
Tl 205	0.100	0.110	0.101	0.099	0.103	0.095	0.098	0.101	0.1010	101.00%	0.00473	0.01484	0.100	p		False	False	0.100	0.110	0.101
Pb 208	0.100	0.113	0.108	0.103	0.088	0.084	0.088	0.102	0.0980	98.00%	0.01127	0.03539	0.500	p		False	False	0.100	0.113	0.108
U 238	0.100	0.103	0.100	0.097	0.098	0.096	0.097	0.110	0.1001	100.14%	0.00495	0.01553	0.100	p		False	False	0.100	0.103	0.100

(*) The calculated MDL is more than ten times less than the spiking level.
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an ten times less than the spiking level.
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MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

spreadsheet to check that calculations are

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	5	4.30	4.40
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	5	4.10	5.10
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	6	4.10	5.10
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	10	4.10	5.10
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	5	7.25	8.10
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	5	4.40	4.25

Be 9	0.100	0.103	0.104	0.102	0.096	0.106	0.114	0.107	0.1046	104.57%	0.00547	0.01718	0.500	p		False	False	0.102	0.096	0.106
V 51	0.100	0.076	0.055	0.095	0.078	0.065	0.085	0.143	0.0853	85.29%	0.02856	0.08967	0.500	p		False	False	0.095	0.078	0.065
Cr 52	0.100	0.125	0.114	0.036	0.047	0.022	0.022	0.125	0.0701	70.14%	0.04878	0.15318	1.000	f		True	False	0.036	0.047	0.022
Mn 55	0.100	0.087	0.102	0.085	0.127	0.114	0.122	0.126	0.1090	109.00%	0.01787	0.05611	0.500	p		False	False	0.085	0.127	0.114
Co 59	0.100	0.099	0.100	0.098	0.096	0.099	0.099	0.103	0.0991	99.14%	0.00212	0.00664	0.100	f		True	False	0.098	0.096	0.099
Ni 60	0.100	0.080	0.089	0.095	0.071	0.089	0.079	0.095	0.0854	85.43%	0.00902	0.02831	0.500	p		False	False	0.095	0.071	0.089
Cu 63	0.100	0.063	0.067	0.108	0.075	0.077	0.070	0.108	0.0811	81.14%	0.01893	0.05945	0.100	p		False	False	0.108	0.075	0.077
Zn 66	0.100	0.046	0.046	0.527	-4.145	-4.158	-4.097	0.527	-1.6077	1607.71%	2.37072	7.44406	1.000	f	w	True	True	0.527	-4.145	-4.158
As 75	0.100	0.101	0.122	0.082	0.198	0.136	0.150	0.115	0.1291	129.14%	0.03761	0.11811	0.500	f		True	False	0.082	0.198	0.136
Se 82	0.500	0.279	0.598	0.357	0.533	0.393	0.467	0.384	0.4301	86.03%	0.10941	0.34353	1.000	p		False	False	0.357	0.533	0.393
Mo 98	0.100	0.104	0.108	0.103	0.105	0.102	0.102	0.107	0.1044	104.43%	0.00237	0.00744	0.500	f		True	False	0.103	0.105	0.102
Ag 107	0.100	0.095	0.101	0.097	0.097	0.093	0.088	0.054	0.0893	89.29%	0.01607	0.05046	0.100	p		False	False	0.097	0.097	0.093
Cd 111	0.100	0.107	0.099	0.103	0.119	0.11	0.091	0.101	0.1043	104.29%	0.00888	0.02789	0.100	p		False	False	0.103	0.119	0.11
Sb 123	0.100	0.393	0.319	0.297	0.377	0.312	0.239	0.418	0.3364	336.43%	0.06251	0.19629	0.500	f	w	True	True	0.297	0.377	0.312
Ba 137	0.100	0.103	0.102	0.099	0.075	0.069	0.070	0.088	0.0866	86.57%	0.01518	0.04765	0.500	p		False	False	0.099	0.075	0.069
Tl 205	0.100	0.110	0.101	0.099	0.103	0.095	0.098	0.101	0.1010	101.00%	0.00473	0.01484	0.100	p		False	False	0.099	0.103	0.095
Pb 208	0.100	0.113	0.108	0.103	0.088	0.084	0.088	0.102	0.0980	98.00%	0.01127	0.03539	0.500	p		False	False	0.103	0.088	0.084
U 238	0.100	0.103	0.100	0.097	0.098	0.096	0.097	0.110	0.1001	100.14%	0.00495	0.01553	0.100	p		False	False	0.097	0.098	0.096

(*) The calculated MDL is more than ten times less than the spiking level.

level and may not be accurate. T

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

d formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.30	4.50	4.60
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	2.20	6.50	7.50
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	2.20	6.50	7.50
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	2.20	6.50	7.50
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.50	7.60	7.50
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.40	4.60	4.90

Be 9	0.100	0.103	0.104	0.102	0.096	0.106	0.114	0.107	0.1046	104.57%	0.00547	0.01718	0.500	p		False	False	0.114	0.107	0.1046
V 51	0.100	0.076	0.055	0.095	0.078	0.065	0.085	0.143	0.0853	85.29%	0.02856	0.08967	0.500	p		False	False	0.085	0.143	0.0853
Cr 52	0.100	0.125	0.114	0.036	0.047	0.022	0.022	0.125	0.0701	70.14%	0.04878	0.15318	1.000	f		True	False	0.022	0.125	0.0701
Mn 55	0.100	0.087	0.102	0.085	0.127	0.114	0.122	0.126	0.1090	109.00%	0.01787	0.05611	0.500	p		False	False	0.122	0.126	0.1090
Co 59	0.100	0.099	0.100	0.098	0.096	0.099	0.099	0.103	0.0991	99.14%	0.00212	0.00664	0.100	f		True	False	0.099	0.103	0.0991
Ni 60	0.100	0.080	0.089	0.095	0.071	0.089	0.079	0.095	0.0854	85.43%	0.00902	0.02831	0.500	p		False	False	0.079	0.095	0.0854
Cu 63	0.100	0.063	0.067	0.108	0.075	0.077	0.070	0.108	0.0811	81.14%	0.01893	0.05945	0.100	p		False	False	0.070	0.108	0.0811
Zn 66	0.100	0.046	0.046	0.527	-4.145	-4.158	-4.097	0.527	-1.6077	1607.71%	2.37072	7.44406	1.000	f	w	True	True	-4.097	0.527	-1.6077
As 75	0.100	0.101	0.122	0.082	0.198	0.136	0.150	0.115	0.1291	129.14%	0.03761	0.11811	0.500	f		True	False	0.150	0.115	0.1291
Se 82	0.500	0.279	0.598	0.357	0.533	0.393	0.467	0.384	0.4301	86.03%	0.10941	0.34353	1.000	p		False	False	0.467	0.384	0.4301
Mo 98	0.100	0.104	0.108	0.103	0.105	0.102	0.102	0.107	0.1044	104.43%	0.00237	0.00744	0.500	f		True	False	0.102	0.107	0.1044
Ag 107	0.100	0.095	0.101	0.097	0.097	0.093	0.088	0.054	0.0893	89.29%	0.01607	0.05046	0.100	p		False	False	0.088	0.054	0.0893
Cd 111	0.100	0.107	0.099	0.103	0.119	0.11	0.091	0.101	0.1043	104.29%	0.00888	0.02789	0.100	p		False	False	0.091	0.101	0.1043
Sb 123	0.100	0.393	0.319	0.297	0.377	0.312	0.239	0.418	0.3364	336.43%	0.06251	0.19629	0.500	f	w	True	True	0.239	0.418	0.3364
Ba 137	0.100	0.103	0.102	0.099	0.075	0.069	0.070	0.088	0.0866	86.57%	0.01518	0.04765	0.500	p		False	False	0.070	0.088	0.0866
Tl 205	0.100	0.110	0.101	0.099	0.103	0.095	0.098	0.101	0.1010	101.00%	0.00473	0.01484	0.100	p		False	False	0.098	0.101	0.1010
Pb 208	0.100	0.113	0.108	0.103	0.088	0.084	0.088	0.102	0.0980	98.00%	0.01127	0.03539	0.500	p		False	False	0.088	0.102	0.0980
U 238	0.100	0.103	0.100	0.097	0.098	0.096	0.097	0.110	0.1001	100.14%	0.00495	0.01553	0.100	p		False	False	0.097	0.110	0.1001

(*) The calculated MDL is more than ten times less than the spiking level.

the MDL value has been increased

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.30	4.50	4.41
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	4.40	4.30	4.87
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	4.40	4.30	4.87
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	4.40	4.30	4.87
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.75	7.60	7.61
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.30	4.20	4.44

Be 9	0.100	0.103	0.104	0.102	0.096	0.106	0.114	0.107	0.1046	104.57%	0.00547	0.01718	0.500	p		False	False	104.57%	0.00547	0.01718
V 51	0.100	0.076	0.055	0.095	0.078	0.065	0.085	0.143	0.0853	85.29%	0.02856	0.08967	0.500	p		False	False	85.29%	0.02856	0.08967
Cr 52	0.100	0.125	0.114	0.036	0.047	0.022	0.022	0.125	0.0701	70.14%	0.04878	0.15318	1.000	f		True	False	70.14%	0.04878	0.15318
Mn 55	0.100	0.087	0.102	0.085	0.127	0.114	0.122	0.126	0.1090	109.00%	0.01787	0.05611	0.500	p		False	False	109.00%	0.01787	0.05611
Co 59	0.100	0.099	0.100	0.098	0.096	0.099	0.099	0.103	0.0991	99.14%	0.00212	0.00664	0.100	f		True	False	99.14%	0.00212	0.00664
Ni 60	0.100	0.080	0.089	0.095	0.071	0.089	0.079	0.095	0.0854	85.43%	0.00902	0.02831	0.500	p		False	False	85.43%	0.00902	0.02831
Cu 63	0.100	0.063	0.067	0.108	0.075	0.077	0.070	0.108	0.0811	81.14%	0.01893	0.05945	0.100	p		False	False	81.14%	0.01893	0.05945
Zn 66	0.100	0.046	0.046	0.527	-4.145	-4.158	-4.097	0.527	-1.6077	1607.71%	2.37072	7.44406	1.000	f	w	True	True	1607.71%	2.37072	7.44406
As 75	0.100	0.101	0.122	0.082	0.198	0.136	0.150	0.115	0.1291	129.14%	0.03761	0.11811	0.500	f		True	False	129.14%	0.03761	0.11811
Se 82	0.500	0.279	0.598	0.357	0.533	0.393	0.467	0.384	0.4301	86.03%	0.10941	0.34353	1.000	p		False	False	86.03%	0.10941	0.34353
Mo 98	0.100	0.104	0.108	0.103	0.105	0.102	0.102	0.107	0.1044	104.43%	0.00237	0.00744	0.500	f		True	False	104.43%	0.00237	0.00744
Ag 107	0.100	0.095	0.101	0.097	0.097	0.093	0.088	0.054	0.0893	89.29%	0.01607	0.05046	0.100	p		False	False	89.29%	0.01607	0.05046
Cd 111	0.100	0.107	0.099	0.103	0.119	0.11	0.091	0.101	0.1043	104.29%	0.00888	0.02789	0.100	p		False	False	104.29%	0.00888	0.02789
Sb 123	0.100	0.393	0.319	0.297	0.377	0.312	0.239	0.418	0.3364	336.43%	0.06251	0.19629	0.500	f	w	True	True	336.43%	0.06251	0.19629
Ba 137	0.100	0.103	0.102	0.099	0.075	0.069	0.070	0.088	0.0866	86.57%	0.01518	0.04765	0.500	p		False	False	86.57%	0.01518	0.04765
Tl 205	0.100	0.110	0.101	0.099	0.103	0.095	0.098	0.101	0.1010	101.00%	0.00473	0.01484	0.100	p		False	False	101.00%	0.00473	0.01484
Pb 208	0.100	0.113	0.108	0.103	0.088	0.084	0.088	0.102	0.0980	98.00%	0.01127	0.03539	0.500	p		False	False	98.00%	0.01127	0.03539
U 238	0.100	0.103	0.100	0.097	0.098	0.096	0.097	0.110	0.1001	100.14%	0.00495	0.01553	0.100	p		False	False	100.14%	0.00495	0.01553

(*) The calculated MDL is more than ten times less than the spiking level.

to exactly

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	88.29%	0.12	0.38
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	97.43%	1.73	5.43
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	81.19%	1.73	5.43
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	48.71%	1.73	5.43
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	152.29%	0.26	0.83
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	88.71%	0.24	0.76

Be 9	0.100	0.103	0.104	0.102	0.096	0.106	0.114	0.107	0.1046	104.57%	0.00547	0.01718	0.500	p		False	False	0.500	p	
V 51	0.100	0.076	0.055	0.095	0.078	0.065	0.085	0.143	0.0853	85.29%	0.02856	0.08967	0.500	p		False	False	0.500	p	
Cr 52	0.100	0.125	0.114	0.036	0.047	0.022	0.022	0.125	0.0701	70.14%	0.04878	0.15318	1.000	f		True	False	1.000	f	
Mn 55	0.100	0.087	0.102	0.085	0.127	0.114	0.122	0.126	0.1090	109.00%	0.01787	0.05611	0.500	p		False	False	0.500	p	
Co 59	0.100	0.099	0.100	0.098	0.096	0.099	0.099	0.103	0.0991	99.14%	0.00212	0.00664	0.100	f		True	False	0.100	f	
Ni 60	0.100	0.080	0.089	0.095	0.071	0.089	0.079	0.095	0.0854	85.43%	0.00902	0.02831	0.500	p		False	False	0.500	p	
Cu 63	0.100	0.063	0.067	0.108	0.075	0.077	0.070	0.108	0.0811	81.14%	0.01893	0.05945	0.100	p		False	False	0.100	p	
Zn 66	0.100	0.046	0.046	0.527	-4.145	-4.158	-4.097	0.527	-1.6077	1607.71%	2.37072	7.44406	1.000	f	w	True	True	1.000	f	w
As 75	0.100	0.101	0.122	0.082	0.198	0.136	0.150	0.115	0.1291	129.14%	0.03761	0.11811	0.500	f		True	False	0.500	f	
Se 82	0.500	0.279	0.598	0.357	0.533	0.393	0.467	0.384	0.4301	86.03%	0.10941	0.34353	1.000	p		False	False	1.000	p	
Mo 98	0.100	0.104	0.108	0.103	0.105	0.102	0.102	0.107	0.1044	104.43%	0.00237	0.00744	0.500	f		True	False	0.500	f	
Ag 107	0.100	0.095	0.101	0.097	0.097	0.093	0.088	0.054	0.0893	89.29%	0.01607	0.05046	0.100	p		False	False	0.100	p	
Cd 111	0.100	0.107	0.099	0.103	0.119	0.11	0.091	0.101	0.1043	104.29%	0.00888	0.02789	0.100	p		False	False	0.100	p	
Sb 123	0.100	0.393	0.319	0.297	0.377	0.312	0.239	0.418	0.3364	336.43%	0.06251	0.19629	0.500	f	w	True	True	0.500	f	w
Ba 137	0.100	0.103	0.102	0.099	0.075	0.069	0.070	0.088	0.0866	86.57%	0.01518	0.04765	0.500	p		False	False	0.500	p	
Tl 205	0.100	0.110	0.101	0.099	0.103	0.095	0.098	0.101	0.1010	101.00%	0.00473	0.01484	0.100	p		False	False	0.100	p	
Pb 208	0.100	0.113	0.108	0.103	0.088	0.084	0.088	0.102	0.0980	98.00%	0.01127	0.03539	0.500	p		False	False	0.500	p	
U 238	0.100	0.103	0.100	0.097	0.098	0.096	0.097	0.110	0.1001	100.14%	0.00495	0.01553	0.100	p		False	False	0.100	p	

(*) The calculated MDL is more than ten times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	5	f	
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	10	f	
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	5	f	
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	10	p	w
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	5	p	w
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	5	p	

Be 9	0.300	0.2780	0.2930	0.2980	0.3450	0.3650	0.3140	0.2720	0.3093	103.10%	0.03455	0.10850	0.500	p		False	False	Be 9
V 51	0.300	0.3290	0.3010	0.3060	0.3020	0.3180	0.2990	0.3020	0.3081	102.71%	0.01116	0.03503	0.500	p		False	False	V 51
Cr 52	0.300	0.2170	0.1810	0.2160	0.3470	0.3440	0.2470	0.2580	0.2586	86.19%	0.06430	0.20191	1.000	p		False	False	Cr 52
Mn 55	0.300	0.3160	0.3100	0.3220	0.3310	0.3740	0.3360	0.3050	0.3277	109.24%	0.02317	0.07276	0.500	p		False	False	Mn 55
Co 59	0.300	0.3070	0.2920	0.3130	0.3200	0.3200	0.3220	0.2950	0.3099	103.29%	0.01232	0.03869	0.100	p		False	False	Co 59
Ni 60	0.300	0.3000	0.3110	0.2770	0.3060	0.3010	0.2830	0.2770	0.2936	97.86%	0.01423	0.04470	0.500	p		False	False	Ni 60
Cu 63	0.300	0.3750	0.3780	0.3680	0.3080	0.3040	0.2760	0.6720	0.3830	127.67%	0.13364	0.41961	0.100	f		True	False	Cu 63
Zn 66	0.300	0.0280	0.1420	0.2470	0.3010	0.3030	0.9780	0.7990	0.3997	133.24%	0.35139	1.10337	1.000	f		True	False	Zn 66
As 75	0.300	0.2920	0.2920	0.3330	0.3690	0.3510	0.3400	0.2280	0.3150	105.00%	0.04794	0.15052	0.500	p		False	False	As 75
Se 82	1.500	1.2530	1.3370	1.4640	1.7260	1.5880	1.5580	0.7030	1.3756	91.70%	0.33613	1.05544	1.000	f		True	False	Se 82
Mo 98	0.300	0.2930	0.2930	0.2970	0.2990	0.3040	0.3000	0.3010	0.2981	99.38%	0.00410	0.01287	0.500	f		True	False	Mo 98
Ag 107	0.300	0.2930	0.2800	0.2770	0.2880	0.2850	0.2940	0.1910	0.2726	90.86%	0.03651	0.11464	0.100	f		True	False	Ag 107
Cd 111	0.300	0.2650	0.3080	0.2960	0.3080	0.2960	0.2910	0.3080	0.2960	98.67%	0.01537	0.04827	0.100	p		False	False	Cd 111
Sb 123	0.300	0.4230	0.4290	0.3810	0.4080	0.4120	0.4020	0.4470	0.4146	138.19%	0.02108	0.06619	0.500	p		False	False	Sb 123
Ba 137	0.300	0.2840	0.2870	0.2860	0.2550	0.2520	0.2640	0.2740	0.2717	90.57%	0.01484	0.04660	0.500	p		False	False	Ba 137
Tl 205	0.300	0.2950	0.3030	0.3040	0.3010	0.3040	0.3160	0.2990	0.3031	101.05%	0.00652	0.02046	0.100	f		True	False	Tl 205
Pb 208	0.300	0.3000	0.2990	0.3030	0.2780	0.2800	0.2930	0.3140	0.2953	98.43%	0.01280	0.04020	0.500	p		False	False	Pb 208
U 238	0.300	0.2980	0.2900	0.3000	0.2960	0.2960	0.3180	0.3100	0.3011	100.38%	0.00958	0.03009	0.100	p		False	False	U 238

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

(*) The calculated MDL is more than 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	MDL < 0.10X spike level
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	MDL > spike level
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	MDL > reporting limit
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	% recovery < 50%
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	% recovery > 150%
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	MDL meets all the above

Be 9	0.300	0.2780	0.2930	0.2980	0.3450	0.3650	0.3140	0.2720	0.3093	103.10%	0.03455	0.10850	0.500	p		False	False	0.300	0.2780	0.2930	0.2980
V 51	0.300	0.3290	0.3010	0.3060	0.3020	0.3180	0.2990	0.3020	0.3081	102.71%	0.01116	0.03503	0.500	p		False	False	0.300	0.3290	0.3010	0.3060
Cr 52	0.300	0.2170	0.1810	0.2160	0.3470	0.3440	0.2470	0.2580	0.2586	86.19%	0.06430	0.20191	1.000	p		False	False	0.300	0.2170	0.1810	0.2160
Mn 55	0.300	0.3160	0.3100	0.3220	0.3310	0.3740	0.3360	0.3050	0.3277	109.24%	0.02317	0.07276	0.500	p		False	False	0.300	0.3160	0.3100	0.3220
Co 59	0.300	0.3070	0.2920	0.3130	0.3200	0.3200	0.3220	0.2950	0.3099	103.29%	0.01232	0.03869	0.100	p		False	False	0.300	0.3070	0.2920	0.3130
Ni 60	0.300	0.3000	0.3110	0.2770	0.3060	0.3010	0.2830	0.2770	0.2936	97.86%	0.01423	0.04470	0.500	p		False	False	0.300	0.3000	0.3110	0.2770
Cu 63	0.300	0.3750	0.3780	0.3680	0.3080	0.3040	0.2760	0.6720	0.3830	127.67%	0.13364	0.41961	0.100	f		True	False	0.300	0.3750	0.3780	0.3680
Zn 66	0.300	0.0280	0.1420	0.2470	0.3010	0.3030	0.9780	0.7990	0.3997	133.24%	0.35139	1.10337	1.000	f		True	False	0.300	0.0280	0.1420	0.2470
As 75	0.300	0.2920	0.2920	0.3330	0.3690	0.3510	0.3400	0.2280	0.3150	105.00%	0.04794	0.15052	0.500	p		False	False	0.300	0.2920	0.2920	0.3330
Se 82	1.500	1.2530	1.3370	1.4640	1.7260	1.5880	1.5580	0.7030	1.3756	91.70%	0.33613	1.05544	1.000	f		True	False	1.500	1.2530	1.3370	1.4640
Mo 98	0.300	0.2930	0.2930	0.2970	0.2990	0.3040	0.3000	0.3010	0.2981	99.38%	0.00410	0.01287	0.500	f		True	False	0.300	0.2930	0.2930	0.2970
Ag 107	0.300	0.2930	0.2800	0.2770	0.2880	0.2850	0.2940	0.1910	0.2726	90.86%	0.03651	0.11464	0.100	f		True	False	0.300	0.2930	0.2800	0.2770
Cd 111	0.300	0.2650	0.3080	0.2960	0.3080	0.2960	0.2910	0.3080	0.2960	98.67%	0.01537	0.04827	0.100	p		False	False	0.300	0.2650	0.3080	0.2960
Sb 123	0.300	0.4230	0.4290	0.3810	0.4080	0.4120	0.4020	0.4470	0.4146	138.19%	0.02108	0.06619	0.500	p		False	False	0.300	0.4230	0.4290	0.3810
Ba 137	0.300	0.2840	0.2870	0.2860	0.2550	0.2520	0.2640	0.2740	0.2717	90.57%	0.01484	0.04660	0.500	p		False	False	0.300	0.2840	0.2870	0.2860
Tl 205	0.300	0.2950	0.3030	0.3040	0.3010	0.3040	0.3160	0.2990	0.3031	101.05%	0.00652	0.02046	0.100	f		True	False	0.300	0.2950	0.3030	0.3040
Pb 208	0.300	0.3000	0.2990	0.3030	0.2780	0.2800	0.2930	0.3140	0.2953	98.43%	0.01280	0.04020	0.500	p		False	False	0.300	0.3000	0.2990	0.3030
U 238	0.300	0.2980	0.2900	0.3000	0.2960	0.2960	0.3180	0.3100	0.3011	100.38%	0.00958	0.03009	0.100	p		False	False	0.300	0.2980	0.2900	0.3000

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly ten times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	5	4.30	4.40	4.30
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	5	4.10	5.10	2.20
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	6	4.10	5.10	2.20
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	10	4.10	5.10	2.20
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	5	7.25	8.10	7.50
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	5	4.40	4.25	4.40

Be 9	0.300	0.2780	0.2930	0.2980	0.3450	0.3650	0.3140	0.2720	0.3093	103.10%	0.03455	0.10850	0.500	p		False	False	0.3450	0.3650	0.3140	0.2720
V 51	0.300	0.3290	0.3010	0.3060	0.3020	0.3180	0.2990	0.3020	0.3081	102.71%	0.01116	0.03503	0.500	p		False	False	0.3020	0.3180	0.2990	0.3020
Cr 52	0.300	0.2170	0.1810	0.2160	0.3470	0.3440	0.2470	0.2580	0.2586	86.19%	0.06430	0.20191	1.000	p		False	False	0.3470	0.3440	0.2470	0.2580
Mn 55	0.300	0.3160	0.3100	0.3220	0.3310	0.3740	0.3360	0.3050	0.3277	109.24%	0.02317	0.07276	0.500	p		False	False	0.3310	0.3740	0.3360	0.3050
Co 59	0.300	0.3070	0.2920	0.3130	0.3200	0.3200	0.3220	0.2950	0.3099	103.29%	0.01232	0.03869	0.100	p		False	False	0.3200	0.3200	0.3220	0.2950
Ni 60	0.300	0.3000	0.3110	0.2770	0.3060	0.3010	0.2830	0.2770	0.2936	97.86%	0.01423	0.04470	0.500	p		False	False	0.3060	0.3010	0.2830	0.2770
Cu 63	0.300	0.3750	0.3780	0.3680	0.3080	0.3040	0.2760	0.6720	0.3830	127.67%	0.13364	0.41961	0.100	f		True	False	0.3080	0.3040	0.2760	0.6720
Zn 66	0.300	0.0280	0.1420	0.2470	0.3010	0.3030	0.9780	0.7990	0.3997	133.24%	0.35139	1.10337	1.000	f		True	False	0.3010	0.3030	0.9780	0.7990
As 75	0.300	0.2920	0.2920	0.3330	0.3690	0.3510	0.3400	0.2280	0.3150	105.00%	0.04794	0.15052	0.500	p		False	False	0.3690	0.3510	0.3400	0.2280
Se 82	1.500	1.2530	1.3370	1.4640	1.7260	1.5880	1.5580	0.7030	1.3756	91.70%	0.33613	1.05544	1.000	f		True	False	1.7260	1.5880	1.5580	0.7030
Mo 98	0.300	0.2930	0.2930	0.2970	0.2990	0.3040	0.3000	0.3010	0.2981	99.38%	0.00410	0.01287	0.500	f		True	False	0.2990	0.3040	0.3000	0.3010
Ag 107	0.300	0.2930	0.2800	0.2770	0.2880	0.2850	0.2940	0.1910	0.2726	90.86%	0.03651	0.11464	0.100	f		True	False	0.2880	0.2850	0.2940	0.1910
Cd 111	0.300	0.2650	0.3080	0.2960	0.3080	0.2960	0.2910	0.3080	0.2960	98.67%	0.01537	0.04827	0.100	p		False	False	0.3080	0.2960	0.2910	0.3080
Sb 123	0.300	0.4230	0.4290	0.3810	0.4080	0.4120	0.4020	0.4470	0.4146	138.19%	0.02108	0.06619	0.500	p		False	False	0.4080	0.4120	0.4020	0.4470
Ba 137	0.300	0.2840	0.2870	0.2860	0.2550	0.2520	0.2640	0.2740	0.2717	90.57%	0.01484	0.04660	0.500	p		False	False	0.2550	0.2520	0.2640	0.2740
Tl 205	0.300	0.2950	0.3030	0.3040	0.3010	0.3040	0.3160	0.2990	0.3031	101.05%	0.00652	0.02046	0.100	f		True	False	0.3010	0.3040	0.3160	0.2990
Pb 208	0.300	0.3000	0.2990	0.3030	0.2780	0.2800	0.2930	0.3140	0.2953	98.43%	0.01280	0.04020	0.500	p		False	False	0.2780	0.2800	0.2930	0.3140
U 238	0.300	0.2980	0.2900	0.3000	0.2960	0.2960	0.3180	0.3100	0.3011	100.38%	0.00958	0.03009	0.100	p		False	False	0.2960	0.2960	0.3180	0.3100

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.50	4.60	4.30	4.50
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	6.50	7.50	4.40	4.30
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	6.50	7.50	4.40	4.30
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	6.50	7.50	4.40	4.30
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.60	7.50	7.75	7.60
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.60	4.90	4.30	4.20

Be 9	0.300	0.2780	0.2930	0.2980	0.3450	0.3650	0.3140	0.2720	0.3093	103.10%	0.03455	0.10850	0.500	p		False	False	0.3093	103.10%	0.03455
V 51	0.300	0.3290	0.3010	0.3060	0.3020	0.3180	0.2990	0.3020	0.3081	102.71%	0.01116	0.03503	0.500	p		False	False	0.3081	102.71%	0.01116
Cr 52	0.300	0.2170	0.1810	0.2160	0.3470	0.3440	0.2470	0.2580	0.2586	86.19%	0.06430	0.20191	1.000	p		False	False	0.2586	86.19%	0.06430
Mn 55	0.300	0.3160	0.3100	0.3220	0.3310	0.3740	0.3360	0.3050	0.3277	109.24%	0.02317	0.07276	0.500	p		False	False	0.3277	109.24%	0.02317
Co 59	0.300	0.3070	0.2920	0.3130	0.3200	0.3200	0.3220	0.2950	0.3099	103.29%	0.01232	0.03869	0.100	p		False	False	0.3099	103.29%	0.01232
Ni 60	0.300	0.3000	0.3110	0.2770	0.3060	0.3010	0.2830	0.2770	0.2936	97.86%	0.01423	0.04470	0.500	p		False	False	0.2936	97.86%	0.01423
Cu 63	0.300	0.3750	0.3780	0.3680	0.3080	0.3040	0.2760	0.6720	0.3830	127.67%	0.13364	0.41961	0.100	f		True	False	0.3830	127.67%	0.13364
Zn 66	0.300	0.0280	0.1420	0.2470	0.3010	0.3030	0.9780	0.7990	0.3997	133.24%	0.35139	1.10337	1.000	f		True	False	0.3997	133.24%	0.35139
As 75	0.300	0.2920	0.2920	0.3330	0.3690	0.3510	0.3400	0.2280	0.3150	105.00%	0.04794	0.15052	0.500	p		False	False	0.3150	105.00%	0.04794
Se 82	1.500	1.2530	1.3370	1.4640	1.7260	1.5880	1.5580	0.7030	1.3756	91.70%	0.33613	1.05544	1.000	f		True	False	1.3756	91.70%	0.33613
Mo 98	0.300	0.2930	0.2930	0.2970	0.2990	0.3040	0.3000	0.3010	0.2981	99.38%	0.00410	0.01287	0.500	f		True	False	0.2981	99.38%	0.00410
Ag 107	0.300	0.2930	0.2800	0.2770	0.2880	0.2850	0.2940	0.1910	0.2726	90.86%	0.03651	0.11464	0.100	f		True	False	0.2726	90.86%	0.03651
Cd 111	0.300	0.2650	0.3080	0.2960	0.3080	0.2960	0.2910	0.3080	0.2960	98.67%	0.01537	0.04827	0.100	p		False	False	0.2960	98.67%	0.01537
Sb 123	0.300	0.4230	0.4290	0.3810	0.4080	0.4120	0.4020	0.4470	0.4146	138.19%	0.02108	0.06619	0.500	p		False	False	0.4146	138.19%	0.02108
Ba 137	0.300	0.2840	0.2870	0.2860	0.2550	0.2520	0.2640	0.2740	0.2717	90.57%	0.01484	0.04660	0.500	p		False	False	0.2717	90.57%	0.01484
Tl 205	0.300	0.2950	0.3030	0.3040	0.3010	0.3040	0.3160	0.2990	0.3031	101.05%	0.00652	0.02046	0.100	f		True	False	0.3031	101.05%	0.00652
Pb 208	0.300	0.3000	0.2990	0.3030	0.2780	0.2800	0.2930	0.3140	0.2953	98.43%	0.01280	0.04020	0.500	p		False	False	0.2953	98.43%	0.01280
U 238	0.300	0.2980	0.2900	0.3000	0.2960	0.2960	0.3180	0.3100	0.3011	100.38%	0.00958	0.03009	0.100	p		False	False	0.3011	100.38%	0.00958

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level. DL value has been increased to exactly 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.41	88.29%	0.12
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	4.87	97.43%	1.73
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	4.87	81.19%	1.73
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	4.87	48.71%	1.73
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.61	152.29%	0.26
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.44	88.71%	0.24

Be 9	0.300	0.2780	0.2930	0.2980	0.3450	0.3650	0.3140	0.2720	0.3093	103.10%	0.03455	0.10850	0.500	p		False	False	0.10850	0.500	p
V 51	0.300	0.3290	0.3010	0.3060	0.3020	0.3180	0.2990	0.3020	0.3081	102.71%	0.01116	0.03503	0.500	p		False	False	0.03503	0.500	p
Cr 52	0.300	0.2170	0.1810	0.2160	0.3470	0.3440	0.2470	0.2580	0.2586	86.19%	0.06430	0.20191	1.000	p		False	False	0.20191	1.000	p
Mn 55	0.300	0.3160	0.3100	0.3220	0.3310	0.3740	0.3360	0.3050	0.3277	109.24%	0.02317	0.07276	0.500	p		False	False	0.07276	0.500	p
Co 59	0.300	0.3070	0.2920	0.3130	0.3200	0.3200	0.3220	0.2950	0.3099	103.29%	0.01232	0.03869	0.100	p		False	False	0.03869	0.100	p
Ni 60	0.300	0.3000	0.3110	0.2770	0.3060	0.3010	0.2830	0.2770	0.2936	97.86%	0.01423	0.04470	0.500	p		False	False	0.04470	0.500	p
Cu 63	0.300	0.3750	0.3780	0.3680	0.3080	0.3040	0.2760	0.6720	0.3830	127.67%	0.13364	0.41961	0.100	f		True	False	0.41961	0.100	f
Zn 66	0.300	0.0280	0.1420	0.2470	0.3010	0.3030	0.9780	0.7990	0.3997	133.24%	0.35139	1.10337	1.000	f		True	False	1.10337	1.000	f
As 75	0.300	0.2920	0.2920	0.3330	0.3690	0.3510	0.3400	0.2280	0.3150	105.00%	0.04794	0.15052	0.500	p		False	False	0.15052	0.500	p
Se 82	1.500	1.2530	1.3370	1.4640	1.7260	1.5880	1.5580	0.7030	1.3756	91.70%	0.33613	1.05544	1.000	f		True	False	1.05544	1.000	f
Mo 98	0.300	0.2930	0.2930	0.2970	0.2990	0.3040	0.3000	0.3010	0.2981	99.38%	0.00410	0.01287	0.500	f		True	False	0.01287	0.500	f
Ag 107	0.300	0.2930	0.2800	0.2770	0.2880	0.2850	0.2940	0.1910	0.2726	90.86%	0.03651	0.11464	0.100	f		True	False	0.11464	0.100	f
Cd 111	0.300	0.2650	0.3080	0.2960	0.3080	0.2960	0.2910	0.3080	0.2960	98.67%	0.01537	0.04827	0.100	p		False	False	0.04827	0.100	p
Sb 123	0.300	0.4230	0.4290	0.3810	0.4080	0.4120	0.4020	0.4470	0.4146	138.19%	0.02108	0.06619	0.500	p		False	False	0.06619	0.500	p
Ba 137	0.300	0.2840	0.2870	0.2860	0.2550	0.2520	0.2640	0.2740	0.2717	90.57%	0.01484	0.04660	0.500	p		False	False	0.04660	0.500	p
Tl 205	0.300	0.2950	0.3030	0.3040	0.3010	0.3040	0.3160	0.2990	0.3031	101.05%	0.00652	0.02046	0.100	f		True	False	0.02046	0.100	f
Pb 208	0.300	0.3000	0.2990	0.3030	0.2780	0.2800	0.2930	0.3140	0.2953	98.43%	0.01280	0.04020	0.500	p		False	False	0.04020	0.500	p
U 238	0.300	0.2980	0.2900	0.3000	0.2960	0.2960	0.3180	0.3100	0.3011	100.38%	0.00958	0.03009	0.100	p		False	False	0.03009	0.100	p

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

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MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	0.38	5	f	
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	5.43	10	f	
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	5.43	5	f	
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	5.43	10	p	w
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	0.83	5	p	w
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	0.76	5	p	

Be 9	0.500	0.4920	0.4990	0.5050	0.5530	0.5120	0.5510	0.5040	0.5166	103.31%	0.02496	0.07837	0.500	p		False	False	Be 9
V 51	0.500	0.4700	0.5010	0.4930	0.4950	0.5180	0.5210	0.5260	0.5034	100.69%	0.01972	0.06193	0.500	p		False	False	V 51
Cr 52	0.500	0.3490	0.4030	0.3560	0.5450	0.5610	0.5210	0.4640	0.4570	91.40%	0.08896	0.27934	1.000	p		False	False	Cr 52
Mn 55	0.500	0.4930	0.5070	0.5420	0.5140	0.4920	0.4860	0.5390	0.5104	102.09%	0.02265	0.07112	0.500	p		False	False	Mn 55
Co 59	0.500	0.4860	0.4960	0.5230	0.5230	0.5500	0.5600	0.5170	0.5221	104.43%	0.02654	0.08334	0.100	p		False	False	Co 59
Ni 60	0.500	0.4850	0.4560	0.5040	0.4890	0.5040	0.5230	0.5040	0.4950	99.00%	0.02115	0.06641	0.500	p		False	False	Ni 60
Cu 63	0.500	0.5280	0.5570	0.5530	0.5170	0.4940	0.4790	0.5320	0.5229	104.57%	0.02879	0.09042	0.100	p		False	False	Cu 63
Zn 66	0.500	0.4680	0.5360	0.5440	0.6170	0.5380	0.7810	0.8070	0.6130	122.60%	0.13116	0.41184	1.000	p		False	False	Zn 66
As 75	0.500	0.4720	0.4170	0.4070	0.5530	0.5470	0.5760	0.4040	0.4823	96.46%	0.07543	0.23684	0.500	p		False	False	As 75
Se 82	2.500	2.2650	2.1390	2.0830	2.6770	2.4540	2.7860	1.5430	2.2781	91.13%	0.41753	1.31104	1.000	f		True	False	Se 82
Mo 98	0.500	0.5020	0.5120	0.4790	0.5030	0.5160	0.5160	0.4850	0.5019	100.37%	0.01478	0.04641	0.500	f		True	False	Mo 98
Ag 107	0.500	0.4750	0.4790	0.4640	0.4990	0.4770	0.5060	0.3530	0.4647	92.94%	0.05135	0.16124	0.100	f		True	False	Ag 107
Cd 111	0.500	0.4870	0.4680	0.4870	0.4940	0.4940	0.5080	0.4750	0.4876	97.51%	0.01318	0.04137	0.100	f		True	False	Cd 111
Sb 123	0.500	0.5200	1.0600	0.8210	0.4900	0.9980	0.7800	0.5470	0.7451	149.03%	0.23277	0.73090	0.500	f		True	False	Sb 123
Ba 137	0.500	0.4610	0.4760	0.4700	0.4520	0.4470	0.4410	0.4990	0.4637	92.74%	0.01990	0.06248	0.500	p		False	False	Ba 137
Tl 205	0.500	0.4980	0.5120	0.5000	0.5050	0.5080	0.5180	0.5020	0.5061	101.23%	0.00708	0.02223	0.100	f		True	False	Tl 205
Pb 208	0.500	0.4880	0.4940	0.4980	0.4800	0.4560	0.4930	0.5150	0.4891	97.83%	0.01811	0.05688	0.100	p		False	False	Pb 208
U 238	0.500	0.4950	0.4980	0.5100	0.4930	0.4940	0.5250	0.5480	0.5090	101.80%	0.02072	0.06506	0.100	p		False	False	U 238

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

(*) The calculated MDL is more than 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	MDL < 0.10X spike level
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	MDL > spike level
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	MDL > reporting limit
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	% recovery < 50%
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	% recovery > 150%
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	MDL meets all the above

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

Be 9	0.500	0.4920	0.4990	0.5050	0.5530	0.5120	0.5510	0.5040	0.5166	103.31%	0.02496	0.07837	0.500	p		False	False	0.500	0.4920	0.4990	0.5050
V 51	0.500	0.4700	0.5010	0.4930	0.4950	0.5180	0.5210	0.5260	0.5034	100.69%	0.01972	0.06193	0.500	p		False	False	0.500	0.4700	0.5010	0.4930
Cr 52	0.500	0.3490	0.4030	0.3560	0.5450	0.5610	0.5210	0.4640	0.4570	91.40%	0.08896	0.27934	1.000	p		False	False	0.500	0.3490	0.4030	0.3560
Mn 55	0.500	0.4930	0.5070	0.5420	0.5140	0.4920	0.4860	0.5390	0.5104	102.09%	0.02265	0.07112	0.500	p		False	False	0.500	0.4930	0.5070	0.5420
Co 59	0.500	0.4860	0.4960	0.5230	0.5230	0.5500	0.5600	0.5170	0.5221	104.43%	0.02654	0.08334	0.100	p		False	False	0.500	0.4860	0.4960	0.5230
Ni 60	0.500	0.4850	0.4560	0.5040	0.4890	0.5040	0.5230	0.5040	0.4950	99.00%	0.02115	0.06641	0.500	p		False	False	0.500	0.4850	0.4560	0.5040
Cu 63	0.500	0.5280	0.5570	0.5530	0.5170	0.4940	0.4790	0.5320	0.5229	104.57%	0.02879	0.09042	0.100	p		False	False	0.500	0.5280	0.5570	0.5530
Zn 66	0.500	0.4680	0.5360	0.5440	0.6170	0.5380	0.7810	0.8070	0.6130	122.60%	0.13116	0.41184	1.000	p		False	False	0.500	0.4680	0.5360	0.5440
As 75	0.500	0.4720	0.4170	0.4070	0.5530	0.5470	0.5760	0.4040	0.4823	96.46%	0.07543	0.23684	0.500	p		False	False	0.500	0.4720	0.4170	0.4070
Se 82	2.500	2.2650	2.1390	2.0830	2.6770	2.4540	2.7860	1.5430	2.2781	91.13%	0.41753	1.31104	1.000	f		True	False	2.500	2.2650	2.1390	2.0830
Mo 98	0.500	0.5020	0.5120	0.4790	0.5030	0.5160	0.5160	0.4850	0.5019	100.37%	0.01478	0.04641	0.500	f		True	False	0.500	0.5020	0.5120	0.4790
Ag 107	0.500	0.4750	0.4790	0.4640	0.4990	0.4770	0.5060	0.3530	0.4647	92.94%	0.05135	0.16124	0.100	f		True	False	0.500	0.4750	0.4790	0.4640
Cd 111	0.500	0.4870	0.4680	0.4870	0.4940	0.4940	0.5080	0.4750	0.4876	97.51%	0.01318	0.04137	0.100	f		True	False	0.500	0.4870	0.4680	0.4870
Sb 123	0.500	0.5200	1.0600	0.8210	0.4900	0.9980	0.7800	0.5470	0.7451	149.03%	0.23277	0.73090	0.500	f		True	False	0.500	0.5200	1.0600	0.8210
Ba 137	0.500	0.4610	0.4760	0.4700	0.4520	0.4470	0.4410	0.4990	0.4637	92.74%	0.01990	0.06248	0.500	p		False	False	0.500	0.4610	0.4760	0.4700
Tl 205	0.500	0.4980	0.5120	0.5000	0.5050	0.5080	0.5180	0.5020	0.5061	101.23%	0.00708	0.02223	0.100	f		True	False	0.500	0.4980	0.5120	0.5000
Pb 208	0.500	0.4880	0.4940	0.4980	0.4800	0.4560	0.4930	0.5150	0.4891	97.83%	0.01811	0.05688	0.100	p		False	False	0.500	0.4880	0.4940	0.4980
U 238	0.500	0.4950	0.4980	0.5100	0.4930	0.4940	0.5250	0.5480	0.5090	101.80%	0.02072	0.06506	0.100	p		False	False	0.500	0.4950	0.4980	0.5100

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly ten times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

spreadsheet to check that calculations and f

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	5	4.30	4.40	4.30
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	5	4.10	5.10	2.20
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	6	4.10	5.10	2.20
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	10	4.10	5.10	2.20
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	5	7.25	8.10	7.50
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	5	4.40	4.25	4.40

Be 9	0.500	0.4920	0.4990	0.5050	0.5530	0.5120	0.5510	0.5040	0.5166	103.31%	0.02496	0.07837	0.500	p		False	False	0.5530	0.5120	0.5510	0.5040
V 51	0.500	0.4700	0.5010	0.4930	0.4950	0.5180	0.5210	0.5260	0.5034	100.69%	0.01972	0.06193	0.500	p		False	False	0.4950	0.5180	0.5210	0.5260
Cr 52	0.500	0.3490	0.4030	0.3560	0.5450	0.5610	0.5210	0.4640	0.4570	91.40%	0.08896	0.27934	1.000	p		False	False	0.5450	0.5610	0.5210	0.4640
Mn 55	0.500	0.4930	0.5070	0.5420	0.5140	0.4920	0.4860	0.5390	0.5104	102.09%	0.02265	0.07112	0.500	p		False	False	0.5140	0.4920	0.4860	0.5390
Co 59	0.500	0.4860	0.4960	0.5230	0.5230	0.5500	0.5600	0.5170	0.5221	104.43%	0.02654	0.08334	0.100	p		False	False	0.5230	0.5500	0.5600	0.5170
Ni 60	0.500	0.4850	0.4560	0.5040	0.4890	0.5040	0.5230	0.5040	0.4950	99.00%	0.02115	0.06641	0.500	p		False	False	0.4890	0.5040	0.5230	0.5040
Cu 63	0.500	0.5280	0.5570	0.5530	0.5170	0.4940	0.4790	0.5320	0.5229	104.57%	0.02879	0.09042	0.100	p		False	False	0.5170	0.4940	0.4790	0.5320
Zn 66	0.500	0.4680	0.5360	0.5440	0.6170	0.5380	0.7810	0.8070	0.6130	122.60%	0.13116	0.41184	1.000	p		False	False	0.6170	0.5380	0.7810	0.8070
As 75	0.500	0.4720	0.4170	0.4070	0.5530	0.5470	0.5760	0.4040	0.4823	96.46%	0.07543	0.23684	0.500	p		False	False	0.5530	0.5470	0.5760	0.4040
Se 82	2.500	2.2650	2.1390	2.0830	2.6770	2.4540	2.7860	1.5430	2.2781	91.13%	0.41753	1.31104	1.000	f		True	False	2.6770	2.4540	2.7860	1.5430
Mo 98	0.500	0.5020	0.5120	0.4790	0.5030	0.5160	0.5160	0.4850	0.5019	100.37%	0.01478	0.04641	0.500	f		True	False	0.5030	0.5160	0.5160	0.4850
Ag 107	0.500	0.4750	0.4790	0.4640	0.4990	0.4770	0.5060	0.3530	0.4647	92.94%	0.05135	0.16124	0.100	f		True	False	0.4990	0.4770	0.5060	0.3530
Cd 111	0.500	0.4870	0.4680	0.4870	0.4940	0.4940	0.5080	0.4750	0.4876	97.51%	0.01318	0.04137	0.100	f		True	False	0.4940	0.4940	0.5080	0.4750
Sb 123	0.500	0.5200	1.0600	0.8210	0.4900	0.9980	0.7800	0.5470	0.7451	149.03%	0.23277	0.73090	0.500	f		True	False	0.4900	0.9980	0.7800	0.5470
Ba 137	0.500	0.4610	0.4760	0.4700	0.4520	0.4470	0.4410	0.4990	0.4637	92.74%	0.01990	0.06248	0.500	p		False	False	0.4520	0.4470	0.4410	0.4990
Tl 205	0.500	0.4980	0.5120	0.5000	0.5050	0.5080	0.5180	0.5020	0.5061	101.23%	0.00708	0.02223	0.100	f		True	False	0.5050	0.5080	0.5180	0.5020
Pb 208	0.500	0.4880	0.4940	0.4980	0.4800	0.4560	0.4930	0.5150	0.4891	97.83%	0.01811	0.05688	0.100	p		False	False	0.4800	0.4560	0.4930	0.5150
U 238	0.500	0.4950	0.4980	0.5100	0.4930	0.4940	0.5250	0.5480	0.5090	101.80%	0.02072	0.06506	0.100	p		False	False	0.4930	0.4940	0.5250	0.5480

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.50	4.60	4.30	4.50
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	6.50	7.50	4.40	4.30
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	6.50	7.50	4.40	4.30
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	6.50	7.50	4.40	4.30
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.60	7.50	7.75	7.60
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.60	4.90	4.30	4.20

Be 9	0.500	0.4920	0.4990	0.5050	0.5530	0.5120	0.5510	0.5040	0.5166	103.31%	0.02496	0.07837	0.500	p		False	False	0.5166	103.31%	0.02496
V 51	0.500	0.4700	0.5010	0.4930	0.4950	0.5180	0.5210	0.5260	0.5034	100.69%	0.01972	0.06193	0.500	p		False	False	0.5034	100.69%	0.01972
Cr 52	0.500	0.3490	0.4030	0.3560	0.5450	0.5610	0.5210	0.4640	0.4570	91.40%	0.08896	0.27934	1.000	p		False	False	0.4570	91.40%	0.08896
Mn 55	0.500	0.4930	0.5070	0.5420	0.5140	0.4920	0.4860	0.5390	0.5104	102.09%	0.02265	0.07112	0.500	p		False	False	0.5104	102.09%	0.02265
Co 59	0.500	0.4860	0.4960	0.5230	0.5230	0.5500	0.5600	0.5170	0.5221	104.43%	0.02654	0.08334	0.100	p		False	False	0.5221	104.43%	0.02654
Ni 60	0.500	0.4850	0.4560	0.5040	0.4890	0.5040	0.5230	0.5040	0.4950	99.00%	0.02115	0.06641	0.500	p		False	False	0.4950	99.00%	0.02115
Cu 63	0.500	0.5280	0.5570	0.5530	0.5170	0.4940	0.4790	0.5320	0.5229	104.57%	0.02879	0.09042	0.100	p		False	False	0.5229	104.57%	0.02879
Zn 66	0.500	0.4680	0.5360	0.5440	0.6170	0.5380	0.7810	0.8070	0.6130	122.60%	0.13116	0.41184	1.000	p		False	False	0.6130	122.60%	0.13116
As 75	0.500	0.4720	0.4170	0.4070	0.5530	0.5470	0.5760	0.4040	0.4823	96.46%	0.07543	0.23684	0.500	p		False	False	0.4823	96.46%	0.07543
Se 82	2.500	2.2650	2.1390	2.0830	2.6770	2.4540	2.7860	1.5430	2.2781	91.13%	0.41753	1.31104	1.000	f		True	False	2.2781	91.13%	0.41753
Mo 98	0.500	0.5020	0.5120	0.4790	0.5030	0.5160	0.5160	0.4850	0.5019	100.37%	0.01478	0.04641	0.500	f		True	False	0.5019	100.37%	0.01478
Ag 107	0.500	0.4750	0.4790	0.4640	0.4990	0.4770	0.5060	0.3530	0.4647	92.94%	0.05135	0.16124	0.100	f		True	False	0.4647	92.94%	0.05135
Cd 111	0.500	0.4870	0.4680	0.4870	0.4940	0.4940	0.5080	0.4750	0.4876	97.51%	0.01318	0.04137	0.100	f		True	False	0.4876	97.51%	0.01318
Sb 123	0.500	0.5200	1.0600	0.8210	0.4900	0.9980	0.7800	0.5470	0.7451	149.03%	0.23277	0.73090	0.500	f		True	False	0.7451	149.03%	0.23277
Ba 137	0.500	0.4610	0.4760	0.4700	0.4520	0.4470	0.4410	0.4990	0.4637	92.74%	0.01990	0.06248	0.500	p		False	False	0.4637	92.74%	0.01990
Tl 205	0.500	0.4980	0.5120	0.5000	0.5050	0.5080	0.5180	0.5020	0.5061	101.23%	0.00708	0.02223	0.100	f		True	False	0.5061	101.23%	0.00708
Pb 208	0.500	0.4880	0.4940	0.4980	0.4800	0.4560	0.4930	0.5150	0.4891	97.83%	0.01811	0.05688	0.100	p		False	False	0.4891	97.83%	0.01811
U 238	0.500	0.4950	0.4980	0.5100	0.4930	0.4940	0.5250	0.5480	0.5090	101.80%	0.02072	0.06506	0.100	p		False	False	0.5090	101.80%	0.02072

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level. DL value has been increased to exactly 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.41	88.29%	0.12
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	4.87	97.43%	1.73
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	4.87	81.19%	1.73
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	4.87	48.71%	1.73
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.61	152.29%	0.26
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.44	88.71%	0.24

Be 9	0.500	0.4920	0.4990	0.5050	0.5530	0.5120	0.5510	0.5040	0.5166	103.31%	0.02496	0.07837	0.500	p		False	False	0.07837	0.500	p
V 51	0.500	0.4700	0.5010	0.4930	0.4950	0.5180	0.5210	0.5260	0.5034	100.69%	0.01972	0.06193	0.500	p		False	False	0.06193	0.500	p
Cr 52	0.500	0.3490	0.4030	0.3560	0.5450	0.5610	0.5210	0.4640	0.4570	91.40%	0.08896	0.27934	1.000	p		False	False	0.27934	1.000	p
Mn 55	0.500	0.4930	0.5070	0.5420	0.5140	0.4920	0.4860	0.5390	0.5104	102.09%	0.02265	0.07112	0.500	p		False	False	0.07112	0.500	p
Co 59	0.500	0.4860	0.4960	0.5230	0.5230	0.5500	0.5600	0.5170	0.5221	104.43%	0.02654	0.08334	0.100	p		False	False	0.08334	0.100	p
Ni 60	0.500	0.4850	0.4560	0.5040	0.4890	0.5040	0.5230	0.5040	0.4950	99.00%	0.02115	0.06641	0.500	p		False	False	0.06641	0.500	p
Cu 63	0.500	0.5280	0.5570	0.5530	0.5170	0.4940	0.4790	0.5320	0.5229	104.57%	0.02879	0.09042	0.100	p		False	False	0.09042	0.100	p
Zn 66	0.500	0.4680	0.5360	0.5440	0.6170	0.5380	0.7810	0.8070	0.6130	122.60%	0.13116	0.41184	1.000	p		False	False	0.41184	1.000	p
As 75	0.500	0.4720	0.4170	0.4070	0.5530	0.5470	0.5760	0.4040	0.4823	96.46%	0.07543	0.23684	0.500	p		False	False	0.23684	0.500	p
Se 82	2.500	2.2650	2.1390	2.0830	2.6770	2.4540	2.7860	1.5430	2.2781	91.13%	0.41753	1.31104	1.000	f		True	False	1.31104	1.000	f
Mo 98	0.500	0.5020	0.5120	0.4790	0.5030	0.5160	0.5160	0.4850	0.5019	100.37%	0.01478	0.04641	0.500	f		True	False	0.04641	0.500	f
Ag 107	0.500	0.4750	0.4790	0.4640	0.4990	0.4770	0.5060	0.3530	0.4647	92.94%	0.05135	0.16124	0.100	f		True	False	0.16124	0.100	f
Cd 111	0.500	0.4870	0.4680	0.4870	0.4940	0.4940	0.5080	0.4750	0.4876	97.51%	0.01318	0.04137	0.100	f		True	False	0.04137	0.100	f
Sb 123	0.500	0.5200	1.0600	0.8210	0.4900	0.9980	0.7800	0.5470	0.7451	149.03%	0.23277	0.73090	0.500	f		True	False	0.73090	0.500	f
Ba 137	0.500	0.4610	0.4760	0.4700	0.4520	0.4470	0.4410	0.4990	0.4637	92.74%	0.01990	0.06248	0.500	p		False	False	0.06248	0.500	p
Tl 205	0.500	0.4980	0.5120	0.5000	0.5050	0.5080	0.5180	0.5020	0.5061	101.23%	0.00708	0.02223	0.100	f		True	False	0.02223	0.100	f
Pb 208	0.500	0.4880	0.4940	0.4980	0.4800	0.4560	0.4930	0.5150	0.4891	97.83%	0.01811	0.05688	0.100	p		False	False	0.05688	0.100	p
U 238	0.500	0.4950	0.4980	0.5100	0.4930	0.4940	0.5250	0.5480	0.5090	101.80%	0.02072	0.06506	0.100	p		False	False	0.06506	0.100	p

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

ctly

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	0.38	5	f	
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	5.43	10	f	
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	5.43	5	f	
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	5.43	10	p	w
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	0.83	5	p	w
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	0.76	5	p	

Be 9	1.000	0.9780	1.1620	1.0500	1.0920	1.0480	1.1920	0.9790	1.0716	107.16%	0.08311	0.26097	0.500	p		False	False	Be 9
V 51	1.000	0.9800	1.0300	1.0160	1.0250	1.0570	1.0680	1.0340	1.0300	103.00%	0.02861	0.08982	0.500	f		True	False	V 51
Cr 52	1.000	0.8470	0.9230	0.9220	1.0660	0.9760	1.1410	1.0130	0.9840	98.40%	0.09884	0.31035	1.000	p		False	False	Cr 52
Mn 55	1.000	1.0730	1.1300	1.1000	1.0150	0.9540	0.9760	1.0620	1.0443	104.43%	0.06489	0.20374	0.500	p		False	False	Mn 55
Co 59	1.000	1.0110	1.0420	1.0320	1.1360	1.0160	1.1100	1.0190	1.0523	105.23%	0.04998	0.15692	0.100	f		True	False	Co 59
Ni 60	1.000	0.9610	1.0080	0.9630	1.0630	1.0110	1.0430	0.9630	1.0017	100.17%	0.04131	0.12973	0.500	p		False	False	Ni 60
Cu 63	1.000	1.1180	1.0940	1.1310	1.0700	0.9800	1.0440	1.0530	1.0700	107.00%	0.05110	0.16045	0.100	f		True	False	Cu 63
Zn 66	1.000	0.9860	1.2020	1.1040	1.0090	0.9770	1.3820	1.2270	1.1267	112.67%	0.15137	0.47531	1.000	p		False	False	Zn 66
As 75	1.000	0.8750	0.9070	0.9020	0.9740	1.0460	0.9600	0.8650	0.9327	93.27%	0.06430	0.20189	0.500	p		False	False	As 75
Se 82	5.000	4.5840	4.8420	4.7630	4.9810	5.0530	4.7430	4.4900	4.7794	95.59%	0.20122	0.63184	1.000	p		False	False	Se 82
Mo 98	1.000	0.9820	1.0110	1.0070	1.0150	0.9930	0.9690	0.9800	0.9939	99.39%	0.01763	0.05536	0.500	f		True	False	Mo 98
Ag 107	1.000	0.9350	0.9770	0.9630	0.9660	0.9520	0.9520	0.8580	0.9433	94.33%	0.03987	0.12518	0.100	f		True	False	Ag 107
Cd 111	1.000	0.9930	0.9730	0.9630	0.9710	0.9480	0.9770	0.9560	0.9687	96.87%	0.01475	0.04632	0.100	f		True	False	Cd 111
Sb 123	1.000	1.1290	1.0860	1.0610	1.0850	1.0410	1.0510	0.8960	1.0499	104.99%	0.07380	0.23174	0.500	p		False	False	Sb 123
Ba 137	1.000	1.0040	0.9520	0.9600	0.8950	0.8950	0.9010	0.9470	0.9363	93.63%	0.04116	0.12923	0.500	p		False	False	Ba 137
Tl 205	1.000	1.0050	1.0150	1.0150	0.9900	0.9670	1.0010	1.0230	1.0023	100.23%	0.01896	0.05954	0.100	f		True	False	Tl 205
Pb 208	1.000	0.9990	0.9980	0.9820	0.9370	0.9300	0.9250	1.0270	0.9711	97.11%	0.04026	0.12640	0.500	p		False	False	Pb 208
U 238	1.000	1.0150	1.0210	1.0020	0.9850	0.9740	0.9830	1.0720	1.0074	100.74%	0.03331	0.10460	0.100	f		True	False	U 238

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(*) The calculated MDL is more than 10 times less than the spiking level.

MDL Spreadsheet Validation

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	MDL < 0.10X spike level
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	MDL > spike level
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	MDL > reporting limit
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	% recovery < 50%
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	% recovery > 150%
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	MDL meets all the above

Be 9	1.000	0.9780	1.1620	1.0500	1.0920	1.0480	1.1920	0.9790	1.0716	107.16%	0.08311	0.26097	0.500	p		False	False	1.000	0.9780	1.1620	1.0500
V 51	1.000	0.9800	1.0300	1.0160	1.0250	1.0570	1.0680	1.0340	1.0300	103.00%	0.02861	0.08982	0.500	f		True	False	1.000	0.9800	1.0300	1.0160
Cr 52	1.000	0.8470	0.9230	0.9220	1.0660	0.9760	1.1410	1.0130	0.9840	98.40%	0.09884	0.31035	1.000	p		False	False	1.000	0.8470	0.9230	0.9220
Mn 55	1.000	1.0730	1.1300	1.1000	1.0150	0.9540	0.9760	1.0620	1.0443	104.43%	0.06489	0.20374	0.500	p		False	False	1.000	1.0730	1.1300	1.1000
Co 59	1.000	1.0110	1.0420	1.0320	1.1360	1.0160	1.1100	1.0190	1.0523	105.23%	0.04998	0.15692	0.100	f		True	False	1.000	1.0110	1.0420	1.0320
Ni 60	1.000	0.9610	1.0080	0.9630	1.0630	1.0110	1.0430	0.9630	1.0017	100.17%	0.04131	0.12973	0.500	p		False	False	1.000	0.9610	1.0080	0.9630
Cu 63	1.000	1.1180	1.0940	1.1310	1.0700	0.9800	1.0440	1.0530	1.0700	107.00%	0.05110	0.16045	0.100	f		True	False	1.000	1.1180	1.0940	1.1310
Zn 66	1.000	0.9860	1.2020	1.1040	1.0090	0.9770	1.3820	1.2270	1.1267	112.67%	0.15137	0.47531	1.000	p		False	False	1.000	0.9860	1.2020	1.1040
As 75	1.000	0.8750	0.9070	0.9020	0.9740	1.0460	0.9600	0.8650	0.9327	93.27%	0.06430	0.20189	0.500	p		False	False	1.000	0.8750	0.9070	0.9020
Se 82	5.000	4.5840	4.8420	4.7630	4.9810	5.0530	4.7430	4.4900	4.7794	95.59%	0.20122	0.63184	1.000	p		False	False	5.000	4.5840	4.8420	4.7630
Mo 98	1.000	0.9820	1.0110	1.0070	1.0150	0.9930	0.9690	0.9800	0.9939	99.39%	0.01763	0.05536	0.500	f		True	False	1.000	0.9820	1.0110	1.0070
Ag 107	1.000	0.9350	0.9770	0.9630	0.9660	0.9520	0.9520	0.8580	0.9433	94.33%	0.03987	0.12518	0.100	f		True	False	1.000	0.9350	0.9770	0.9630
Cd 111	1.000	0.9930	0.9730	0.9630	0.9710	0.9480	0.9770	0.9560	0.9687	96.87%	0.01475	0.04632	0.100	f		True	False	1.000	0.9930	0.9730	0.9630
Sb 123	1.000	1.1290	1.0860	1.0610	1.0850	1.0410	1.0510	0.8960	1.0499	104.99%	0.07380	0.23174	0.500	p		False	False	1.000	1.1290	1.0860	1.0610
Ba 137	1.000	1.0040	0.9520	0.9600	0.8950	0.8950	0.9010	0.9470	0.9363	93.63%	0.04116	0.12923	0.500	p		False	False	1.000	1.0040	0.9520	0.9600
Tl 205	1.000	1.0050	1.0150	1.0150	0.9900	0.9670	1.0010	1.0230	1.0023	100.23%	0.01896	0.05954	0.100	f		True	False	1.000	1.0050	1.0150	1.0150
Pb 208	1.000	0.9990	0.9980	0.9820	0.9370	0.9300	0.9250	1.0270	0.9711	97.11%	0.04026	0.12640	0.500	p		False	False	1.000	0.9990	0.9980	0.9820
U 238	1.000	1.0150	1.0210	1.0020	0.9850	0.9740	0.9830	1.0720	1.0074	100.74%	0.03331	0.10460	0.100	f		True	False	1.000	1.0150	1.0210	1.0020

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MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	5	4.30	4.40	4.30
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	5	4.10	5.10	2.20
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	6	4.10	5.10	2.20
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	10	4.10	5.10	2.20
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	5	7.25	8.10	7.50
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	5	4.40	4.25	4.40

Be 9	1.000	0.9780	1.1620	1.0500	1.0920	1.0480	1.1920	0.9790	1.0716	107.16%	0.08311	0.26097	0.500	p		False	False	1.0920	1.0480	1.1920	0.9790
V 51	1.000	0.9800	1.0300	1.0160	1.0250	1.0570	1.0680	1.0340	1.0300	103.00%	0.02861	0.08982	0.500	f		True	False	1.0250	1.0570	1.0680	1.0340
Cr 52	1.000	0.8470	0.9230	0.9220	1.0660	0.9760	1.1410	1.0130	0.9840	98.40%	0.09884	0.31035	1.000	p		False	False	1.0660	0.9760	1.1410	1.0130
Mn 55	1.000	1.0730	1.1300	1.1000	1.0150	0.9540	0.9760	1.0620	1.0443	104.43%	0.06489	0.20374	0.500	p		False	False	1.0150	0.9540	0.9760	1.0620
Co 59	1.000	1.0110	1.0420	1.0320	1.1360	1.0160	1.1100	1.0190	1.0523	105.23%	0.04998	0.15692	0.100	f		True	False	1.1360	1.0160	1.1100	1.0190
Ni 60	1.000	0.9610	1.0080	0.9630	1.0630	1.0110	1.0430	0.9630	1.0017	100.17%	0.04131	0.12973	0.500	p		False	False	1.0630	1.0110	1.0430	0.9630
Cu 63	1.000	1.1180	1.0940	1.1310	1.0700	0.9800	1.0440	1.0530	1.0700	107.00%	0.05110	0.16045	0.100	f		True	False	1.0700	0.9800	1.0440	1.0530
Zn 66	1.000	0.9860	1.2020	1.1040	1.0090	0.9770	1.3820	1.2270	1.1267	112.67%	0.15137	0.47531	1.000	p		False	False	1.0090	0.9770	1.3820	1.2270
As 75	1.000	0.8750	0.9070	0.9020	0.9740	1.0460	0.9600	0.8650	0.9327	93.27%	0.06430	0.20189	0.500	p		False	False	0.9740	1.0460	0.9600	0.8650
Se 82	5.000	4.5840	4.8420	4.7630	4.9810	5.0530	4.7430	4.4900	4.7794	95.59%	0.20122	0.63184	1.000	p		False	False	4.9810	5.0530	4.7430	4.4900
Mo 98	1.000	0.9820	1.0110	1.0070	1.0150	0.9930	0.9690	0.9800	0.9939	99.39%	0.01763	0.05536	0.500	f		True	False	1.0150	0.9930	0.9690	0.9800
Ag 107	1.000	0.9350	0.9770	0.9630	0.9660	0.9520	0.9520	0.8580	0.9433	94.33%	0.03987	0.12518	0.100	f		True	False	0.9660	0.9520	0.9520	0.8580
Cd 111	1.000	0.9930	0.9730	0.9630	0.9710	0.9480	0.9770	0.9560	0.9687	96.87%	0.01475	0.04632	0.100	f		True	False	0.9710	0.9480	0.9770	0.9560
Sb 123	1.000	1.1290	1.0860	1.0610	1.0850	1.0410	1.0510	0.8960	1.0499	104.99%	0.07380	0.23174	0.500	p		False	False	1.0850	1.0410	1.0510	0.8960
Ba 137	1.000	1.0040	0.9520	0.9600	0.8950	0.8950	0.9010	0.9470	0.9363	93.63%	0.04116	0.12923	0.500	p		False	False	0.8950	0.8950	0.9010	0.9470
Tl 205	1.000	1.0050	1.0150	1.0150	0.9900	0.9670	1.0010	1.0230	1.0023	100.23%	0.01896	0.05954	0.100	f		True	False	0.9900	0.9670	1.0010	1.0230
Pb 208	1.000	0.9990	0.9980	0.9820	0.9370	0.9300	0.9250	1.0270	0.9711	97.11%	0.04026	0.12640	0.500	p		False	False	0.9370	0.9300	0.9250	1.0270
U 238	1.000	1.0150	1.0210	1.0020	0.9850	0.9740	0.9830	1.0720	1.0074	100.74%	0.03331	0.10460	0.100	f		True	False	0.9850	0.9740	0.9830	1.0720

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MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.50	4.60	4.30	4.50
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	6.50	7.50	4.40	4.30
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	6.50	7.50	4.40	4.30
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	6.50	7.50	4.40	4.30
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.60	7.50	7.75	7.60
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.60	4.90	4.30	4.20

Be 9	1.000	0.9780	1.1620	1.0500	1.0920	1.0480	1.1920	0.9790	1.0716	107.16%	0.08311	0.26097	0.500	p		False	False	1.0716	107.16%	0.08311
V 51	1.000	0.9800	1.0300	1.0160	1.0250	1.0570	1.0680	1.0340	1.0300	103.00%	0.02861	0.08982	0.500	f		True	False	1.0300	103.00%	0.02861
Cr 52	1.000	0.8470	0.9230	0.9220	1.0660	0.9760	1.1410	1.0130	0.9840	98.40%	0.09884	0.31035	1.000	p		False	False	0.9840	98.40%	0.09884
Mn 55	1.000	1.0730	1.1300	1.1000	1.0150	0.9540	0.9760	1.0620	1.0443	104.43%	0.06489	0.20374	0.500	p		False	False	1.0443	104.43%	0.06489
Co 59	1.000	1.0110	1.0420	1.0320	1.1360	1.0160	1.1100	1.0190	1.0523	105.23%	0.04998	0.15692	0.100	f		True	False	1.0523	105.23%	0.04998
Ni 60	1.000	0.9610	1.0080	0.9630	1.0630	1.0110	1.0430	0.9630	1.0017	100.17%	0.04131	0.12973	0.500	p		False	False	1.0017	100.17%	0.04131
Cu 63	1.000	1.1180	1.0940	1.1310	1.0700	0.9800	1.0440	1.0530	1.0700	107.00%	0.05110	0.16045	0.100	f		True	False	1.0700	107.00%	0.05110
Zn 66	1.000	0.9860	1.2020	1.1040	1.0090	0.9770	1.3820	1.2270	1.1267	112.67%	0.15137	0.47531	1.000	p		False	False	1.1267	112.67%	0.15137
As 75	1.000	0.8750	0.9070	0.9020	0.9740	1.0460	0.9600	0.8650	0.9327	93.27%	0.06430	0.20189	0.500	p		False	False	0.9327	93.27%	0.06430
Se 82	5.000	4.5840	4.8420	4.7630	4.9810	5.0530	4.7430	4.4900	4.7794	95.59%	0.20122	0.63184	1.000	p		False	False	4.7794	95.59%	0.20122
Mo 98	1.000	0.9820	1.0110	1.0070	1.0150	0.9930	0.9690	0.9800	0.9939	99.39%	0.01763	0.05536	0.500	f		True	False	0.9939	99.39%	0.01763
Ag 107	1.000	0.9350	0.9770	0.9630	0.9660	0.9520	0.9520	0.8580	0.9433	94.33%	0.03987	0.12518	0.100	f		True	False	0.9433	94.33%	0.03987
Cd 111	1.000	0.9930	0.9730	0.9630	0.9710	0.9480	0.9770	0.9560	0.9687	96.87%	0.01475	0.04632	0.100	f		True	False	0.9687	96.87%	0.01475
Sb 123	1.000	1.1290	1.0860	1.0610	1.0850	1.0410	1.0510	0.8960	1.0499	104.99%	0.07380	0.23174	0.500	p		False	False	1.0499	104.99%	0.07380
Ba 137	1.000	1.0040	0.9520	0.9600	0.8950	0.8950	0.9010	0.9470	0.9363	93.63%	0.04116	0.12923	0.500	p		False	False	0.9363	93.63%	0.04116
Tl 205	1.000	1.0050	1.0150	1.0150	0.9900	0.9670	1.0010	1.0230	1.0023	100.23%	0.01896	0.05954	0.100	f		True	False	1.0023	100.23%	0.01896
Pb 208	1.000	0.9990	0.9980	0.9820	0.9370	0.9300	0.9250	1.0270	0.9711	97.11%	0.04026	0.12640	0.500	p		False	False	0.9711	97.11%	0.04026
U 238	1.000	1.0150	1.0210	1.0020	0.9850	0.9740	0.9830	1.0720	1.0074	100.74%	0.03331	0.10460	0.100	f		True	False	1.0074	100.74%	0.03331

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level. DL value has been increased to exactly 10 times less than the spiking level.

MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	4.41	88.29%	0.12
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	4.87	97.43%	1.73
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	4.87	81.19%	1.73
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	4.87	48.71%	1.73
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	7.61	152.29%	0.26
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	4.44	88.71%	0.24

Be 9	1.000	0.9780	1.1620	1.0500	1.0920	1.0480	1.1920	0.9790	1.0716	107.16%	0.08311	0.26097	0.500	p		False	False	0.26097	0.500	p
V 51	1.000	0.9800	1.0300	1.0160	1.0250	1.0570	1.0680	1.0340	1.0300	103.00%	0.02861	0.08982	0.500	f		True	False	0.08982	0.500	f
Cr 52	1.000	0.8470	0.9230	0.9220	1.0660	0.9760	1.1410	1.0130	0.9840	98.40%	0.09884	0.31035	1.000	p		False	False	0.31035	1.000	p
Mn 55	1.000	1.0730	1.1300	1.1000	1.0150	0.9540	0.9760	1.0620	1.0443	104.43%	0.06489	0.20374	0.500	p		False	False	0.20374	0.500	p
Co 59	1.000	1.0110	1.0420	1.0320	1.1360	1.0160	1.1100	1.0190	1.0523	105.23%	0.04998	0.15692	0.100	f		True	False	0.15692	0.100	f
Ni 60	1.000	0.9610	1.0080	0.9630	1.0630	1.0110	1.0430	0.9630	1.0017	100.17%	0.04131	0.12973	0.500	p		False	False	0.12973	0.500	p
Cu 63	1.000	1.1180	1.0940	1.1310	1.0700	0.9800	1.0440	1.0530	1.0700	107.00%	0.05110	0.16045	0.100	f		True	False	0.16045	0.100	f
Zn 66	1.000	0.9860	1.2020	1.1040	1.0090	0.9770	1.3820	1.2270	1.1267	112.67%	0.15137	0.47531	1.000	p		False	False	0.47531	1.000	p
As 75	1.000	0.8750	0.9070	0.9020	0.9740	1.0460	0.9600	0.8650	0.9327	93.27%	0.06430	0.20189	0.500	p		False	False	0.20189	0.500	p
Se 82	5.000	4.5840	4.8420	4.7630	4.9810	5.0530	4.7430	4.4900	4.7794	95.59%	0.20122	0.63184	1.000	p		False	False	0.63184	1.000	p
Mo 98	1.000	0.9820	1.0110	1.0070	1.0150	0.9930	0.9690	0.9800	0.9939	99.39%	0.01763	0.05536	0.500	f		True	False	0.05536	0.500	f
Ag 107	1.000	0.9350	0.9770	0.9630	0.9660	0.9520	0.9520	0.8580	0.9433	94.33%	0.03987	0.12518	0.100	f		True	False	0.12518	0.100	f
Cd 111	1.000	0.9930	0.9730	0.9630	0.9710	0.9480	0.9770	0.9560	0.9687	96.87%	0.01475	0.04632	0.100	f		True	False	0.04632	0.100	f
Sb 123	1.000	1.1290	1.0860	1.0610	1.0850	1.0410	1.0510	0.8960	1.0499	104.99%	0.07380	0.23174	0.500	p		False	False	0.23174	0.500	p
Ba 137	1.000	1.0040	0.9520	0.9600	0.8950	0.8950	0.9010	0.9470	0.9363	93.63%	0.04116	0.12923	0.500	p		False	False	0.12923	0.500	p
Tl 205	1.000	1.0050	1.0150	1.0150	0.9900	0.9670	1.0010	1.0230	1.0023	100.23%	0.01896	0.05954	0.100	f		True	False	0.05954	0.100	f
Pb 208	1.000	0.9990	0.9980	0.9820	0.9370	0.9300	0.9250	1.0270	0.9711	97.11%	0.04026	0.12640	0.500	p		False	False	0.12640	0.500	p
U 238	1.000	1.0150	1.0210	1.0020	0.9850	0.9740	0.9830	1.0720	1.0074	100.74%	0.03331	0.10460	0.100	f		True	False	0.10460	0.100	f

(*) The calculated MDL is more than ten times less than the spiking level and may not be accurate. The MDL value has been increased to exactly 10 times less than the spiking level.

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MDL Spreadsheet Validation

Plug the values listed below into the spreadsheet to check that calculations and formulas are working properly.

MDL < 0.10X spike level	5	4.30	4.40	4.30	4.50	4.60	4.30	4.50	4.41	88.29%	0.12	0.38	5	f		1	0	0.38	5	f	
MDL > spike level	5	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	97.43%	1.73	5.43	10	f		1	0	5.43	10	f	
MDL > reporting limit	6	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	81.19%	1.73	5.43	5	f		1	0	5.43	5	f	
% recovery < 50%	10	4.10	5.10	2.20	6.50	7.50	4.40	4.30	4.87	48.71%	1.73	5.43	10	p	w	0	1	5.43	10	p	w
% recovery > 150%	5	7.25	8.10	7.50	7.60	7.50	7.75	7.60	7.61	152.29%	0.26	0.83	5	p	w	0	1	0.83	5	p	w
MDL meets all the above	5	4.40	4.25	4.40	4.60	4.90	4.30	4.20	4.44	88.71%	0.24	0.76	5	p		0	0	0.76	5	p	